2nd Edition

Adrian Schulz

Architectural Photography

Composition, Capture, and Digital Image Processing

rockynook

Architectural Photography

Architectural Photography

Composition, Capture, and Digital Image Processing

Revised Second Edition

With Comments by Marcus Bredt

Adrian Schulz

rockynook

Adrian Schulz
kontakt@architekturphotos.de
www.adrianschulz.de

Editor: Gerhard Rossbach
Copyeditor: Cynthia Anderson
Proofreader: Sarah Castellanos
Layout and Type: Adrian Schulz
Cover Design: Helmut Kraus, www.exclam.de
Printer: Everbest Printing Co. Ltd.
Printed in China

2nd Edition
© 2012 by Adrian Schulz
Rocky Nook Inc.
802 E. Cota Street, 3rd Floor
Santa Barbara, CA 93103

Library of Congress Cataloging-in-Publication Data

Schulz, Adrian, 1980-
[Architekturfotografie. English]
Architectural photography : composition, capture, and digital image processing / Adrian Schulz. -- 2nd ed.
p. cm.
ISBN 978-1-933952-88-8 (pbk.)
1. Architectural photography. 2. Photography--Digital techniques. I. Title.
TR659.S58513 2012
778.94--dc23
2011037923

Distributed by O'Reilly Media
1005 Gravenstein Highway North
Sebastopol, CA 95472

Many of the designations in this book used by manufacturers and sellers to distinguish their products are claimed as trademarks of their respective companies. Where those designations appear in this

book, and Rocky Nook was aware of a trademark claim, the designations have been printed in caps or initial caps. They are used in editorial fashion only and for the benefit of such companies. They are not intended to convey endorsement or other affiliation with this book.

No part of the material protected by this copyright notice may be reproduced or utilized in any form, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission of the copyright owner. While reasonable care has been exercised in the preparation of this book, the publisher and author assume no responsibility for errors or omissions, or for damages resulting from the use of the information contained herein.

This book is printed on acid-free paper.

Table of Contents

1 Foreword

1.1 What Is Architectural Photography?

1.2 The History of Architectural Photography

1.2.1 Early History

1.2.2 The Invention of Photography

1.2.3 The Twentieth and Twenty-First Centuries

1.3 Authenticity in Architectural Photos

1.4 Forms of Architectural Photography

2 Camera Technology

2.1 Advantages and Disadvantages of Digital Cameras

2.1.1 The Number and Availability of Images

2.1.2 Resolution and Tonal Range

2.1.3 Image Noise and the “Look” of an Image

2.1.4 Image Artifacts

2.1.5 Lens Quality

2.1.6 Digital Image Processing

2.1.7 Image Authenticity and Archiving

2.2 The Camera

2.2.1 Types of Digital Cameras

– Digital Compacts and Bridge Cameras

– Four Thirds, APS-C, DX, and APS-H DSLRs and Mirrorless Interchangeable-Lens Cameras

– Analog and Digital Full-Frame Cameras
– Analog and Digital Medium Format Cameras
– Large Format Cameras
2.2.2 Conclusions Regarding Cameras

2.3 Lenses
2.3.1 Reproduction Characteristics
2.3.2 Focal Length
2.3.3 Tilt/Shift Lenses

2.4 The Perfect Camera/Lens Combination for Every Budget

2.5 Accessories
2.5.1 Choosing a Tripod
2.5.2 Choosing a Tripod Head
2.5.3 Remote Release
2.5.4 Lens Hoods
2.5.5 Filters
2.5.6 Lens Adapters
2.5.7 Grid Focusing Screens
2.5.8 Memory Cards
2.5.9 Batteries
2.5.10 Flash
2.5.11 Other Accessories

2.6 Creative Tips and Tricks
2.6.1 Lensbaby Lenses
2.6.2 Black-and-White Film
2.6.3 Fixed Focal Length Lenses

3 Shooting Techniques

3.1 What Makes a Great Architectural Photo?

3.2 The Role of Architecture as a Photographic Subject

3.2.1 What Types of Architecture Make Suitable Subjects?
3.2.2 Learning to See

3.3 Perspective
3.3.1 The Importance of Vanishing Points

3.4 Converging Verticals
3.4.1 How to Avoid Converging Verticals in Your Photos
3.4.2 How Do Tilt/Shift Lenses Work?

3.5 Camera Standpoint
3.5.1 The Ideal Subject Distance
3.5.2 The Effects of Viewpoint on Perspective
3.5.3 Standpoint and Surroundings
3.5.4 Standpoint and Symmetry
3.5.5 Spatial Depth

3.6 The Effects of Focal Length
3.6.1 Long Focal Length Lenses
3.6.2 Short Focal Length Lenses
3.6.3 Increasing the Angle of View Using Panorama Techniques

3.7 Image Formats
3.7.1 Extreme Formats and Panorama Images
3.7.2 Image Orientation

3.8 Composition and Framing
3.8.1 Composition
3.8.2 Composition and a Subject's Surroundings
– Stationary Image Elements
– People and Other Moving Objects
3.8.3 Selective Framing

3.9 Camera Settings
3.9.1 Shutter Speed
3.9.2 Aperture

3.9.3 ISO Sensitivity
3.9.4 Exposure
3.9.5 Using Bracketing Sequences to Create HDR or DRI Images

3.10 Using Filters

3.11 Interior Architectural Photography
3.11.1 Interior Subjects
3.11.2 Perspective and Standpoint
3.11.3 Focal Length
3.11.4 Image Formats
3.11.5 Framing and Composition
3.11.6 Camera Settings and Lighting

3.12 External Factors That Influence a Shoot
3.12.1 Shadows and Reflections
3.12.2 The Effects of Weather
3.12.3 Choosing the Right Time of Day
3.12.4 The Effects of the Seasons

3.13 Creative Tips and Tricks
3.13.1 Extreme Framing
3.13.2 Image Sequences
3.13.3 Shooting Upwards
3.13.4 Extreme Use of Reflections
3.13.5 Selective Over- and Underexposure
3.13.6 “Before and After” Views
3.13.7 Fake Miniatures

3.14 Solutions to Common Problems

Comments by Marcus Bredt

4 Image Processing

4.1 Digital Image Formats
4.1.1 What Is RAW?
4.1.2 The Differences Between JPEG and RAW
4.1.3 The Advantages of Shooting in RAW Format
4.1.4 Disadvantages of Shooting in RAW Format
4.1.5 Conclusions

4.2 RAW Conversion
4.2.1 A Typical RAW Processing Workflow

4.3 Post-processing
4.3.1 Image Adjustments
– Workflow: Image Adjustments
4.3.2 In-depth Processing: Selective Adjustments to Contrast and Brightness
– Workflow: Selective Contrast and Brightness Correction

4.4 Panoramas
4.4.1 Creating a Planar Panorama
– Workflow: Creating a Planar Panorama Using Hugin
– Workflow: Creating a Planar Panorama Using Photoshop
4.4.2 Shift Panoramas
– Workflow: Creating a Shift Panorama Using Photoshop

4.5 HDR and DRI Images
4.5.1 Workflow: Creating an HDR Image Using Photomatix Pro
4.5.2 Workflow: DRI Processing in Photomatix Pro
4.5.3 Workflow: Creating an HDR Image Using Photoshop
4.5.4 Workflow: DRI Processing in Photoshop

4.6 Creative Tips and Tricks
4.6.1 Digital Graduated Filters
4.6.2 Creating HDR Effects Using a Single RAW Source Image
4.6.3 Converting Images to Black-and-White Using Photoshop
4.6.4 Creating Fake Miniatures Using Photoshop

Index

1 Foreword

The digital photographic medium is currently on an unprecedented roll, and ever-increasing numbers of people are beginning to experiment with the challenges and rewards of this most modern medium. Thanks to the digital revolution, architectural photography, with its endless variety of exciting subjects, has won many new fans among beginners and experienced photographers. Architectural photographers today are blessed with endless creative ways to capture and display their subject.

It is said that a picture is worth a thousand words, and this is particularly true in the field of architectural photography. There is no better medium than a balanced, well-taken photograph for capturing and displaying the look and feel of a building. This book uses numerous pictures to illustrate the examples described in the text, and provides answers to many theoretical and practical questions regarding equipment, technique, and the reasons why sometimes buildings look so different in a photo than they do in reality. There are also comprehensive sections on ways to improve your images and the opportunities presented by the magic of digital image processing.

You will quickly find that architectural photography is a unique and fascinating photographic genre.

1.1 What Is Architectural Photography?

The term “architectural photography” describes both the subject (architecture) and the means of capturing it (photography).

The word “architecture” comes from the Greek “arkhitekton”, which consists of roots meaning “chief” and “builder”. Architecture is ubiquitous in our lives, and its primary function as shelter encompasses a great many functional uses. Architecture is practically a human’s second skin. Le Corbusier once said, “Architecture is one of the most urgent needs of man, for the house has always been the indispensable and first tool that he has forged for himself.”

Architecture takes on an extremely broad range of forms, from simple, primeval huts, the ornate temples of antiquity, and the

purely functional factories of the industrial revolution to today's urban landmarks of concrete and glass. Mankind without architecture would have remained anchored in the stone age, with few options of places to live, sleep, eat, work, trade, produce, withdraw, rest, administer, and educate. In many regions, climatic conditions would make life without architecture impossible.

The word "photography" comes from the Greek "photos" and "graphé", which means "drawing with light", and describes a technical means of optically capturing the likeness of objects and making them palpable in places where they cannot normally be seen. Photography thus propagates images of buildings into the wider world, enabling people to view them in a wide variety of circumstances - whether in newspapers, books, posters, the Internet, or in galleries or museums.

1.2 The History of Architectural Photography

1.2.1 Early History

The history of architectural photography stretches back to the beginning of the 19th century, when the very first photographic attempts were made. Prior to these experiments, the extreme significance of architecture to mankind gave rise to the first paintings of buildings in ancient times (fig. 1). Paintings of buildings are two-dimensional representations of three-dimensional objects, although they are not as directly connected to specific buildings as architectural photographs. Renaissance painters like Michelangelo or Raphael painted bold architectural visions (fig. 2). During the Baroque period, painting was used as an integral part of many architectural designs—wall and ceiling frescos often served to enhance the design of the building itself, and painted surfaces were used to extend architectural space (fig. 3). At around the same time, architectural subjects began to represent a separate, independent genre, especially in the context of Dutch Baroque painting. Public squares and buildings were reproduced in context and in great detail (fig. 4). Other artistic techniques, such as the etchings popular at the time, also used architecture as their subject. European cityscapes by Matthäus Merian (fig. 5) are a particularly good example of this subgenre. The veduta paintings popular in

18th century Italy took extremely realistic representations of landscapes or cities as their subject. While creating his famous paintings of Venice and Dresden (fig. 6), Bernardo Bellotto used the *camera obscura* as a technical aid to producing realistic work. The idea, which goes back to Renaissance times and was also used by the Dutch Baroque painters, is considered to be the forerunner of the modern photographic camera. In Bellotto's era, the device took the form of a portable box with a lens that projected the view in front of the lens onto a ground glass screen, and enabled the artist to accurately reproduce the perspective of the chosen scene (fig. 7). The device guaranteed precise perspective in paintings and drawings and continued to be developed as a result.

Fig. 1: A mural in Pompeii, 1st century AD

Fig. 2: Raphael, The School of Athens *, Stanza della Segnatura, Vatican City, 16th century fresco*

Fig. 3: Cosmas Damian Asam, ceiling fresco in Ettlingen, late Baroque period

Fig. 4: Jan van der Heyden, The Church at Veere *, 17th century, oil on canvas*

Fig. 5: Matthäus Merian, Lübeck *, 17th century, etching*

Fig. 6: Bernardo Belotto, View of Dresden *, mid- 18th century, oil and tempera on canvas*

1.2.2 The Invention of Photography

Although the camera obscura and light-sensitive materials had already been discovered, the invention of the modern photographic process did not take shape until the beginning of the 19th century. In 1827, Nicéphore Niépce used an exposure of several hours and an asphalt-coated plate to capture the view from his window. He called the resulting image a *heliograph* (fig. 8). This earliest surviving photograph already encapsulates one of the main hallmarks of an architectural photo, namely, a depiction of perspective. This image is, coincidentally, also the first architectural photograph, even if the subject was chosen for practical rather than aesthetic reasons. Alongside still lifes, the static nature of architectural subjects made them popular in the early days of photography when extremely long exposure times made it impossible to capture moving subjects.

At around the same time as Niépce, Louis Jacques Mandé Daguerre and William Henry Fox Talbot were experimenting with ways to capture photographs that involved exposure times of just a few minutes. Daguerre's street scenes (fig. 9) are famous examples from this period. His *Daguerrotype* images were all unique and unfortunately cannot be duplicated. Fox Talbot's *Calotype* process couldn't reproduce the same level of detail as Daguerre's plates, but its negative/positive principle made it possible to duplicate images

once they had been captured (fig. 10).

The new medium developed quickly in the following years (fig. 11). An album of photographs of the world's most famous buildings was presented in Paris in 1841, and by the end of the 19th century, photographs were becoming an important element of architectural books and magazines. The disassembly, move, and reassembly of Joseph Paxton's Crystal Palace and the building of the Eiffel Tower in Paris were both documented photographically (fig. 12). Architectural photography began to be used to make foreign countries and cultures accessible to the general public, as well as to document the possessions of individuals and institutions. At this time, reproducibility and documentation were the main motivations behind architectural photography, so the resulting images were correspondingly static, conservative, and often cumbersome.

1.2.3 The Twentieth and Twenty-First Centuries

Changes in architectural styles following World War I brought changes in how buildings were photographed. The Bauhaus movement founded by Walter Gropius in 1919 began to consider photography as an art form, viewing the medium as "the perfect combination of manual dexterity, technical progress, and artistic expression". The German photographers Albert Renger-Patzsch, August Sander, and Karl Bloßfeldt practiced a photographic style termed "New Objectivity". American artists like Walker Evans began to photograph purely functional subjects such as grain silos and factories. Using selective composition and unusual viewpoints of existing structures in their images, photographers began to give architecture a dynamic of its own.

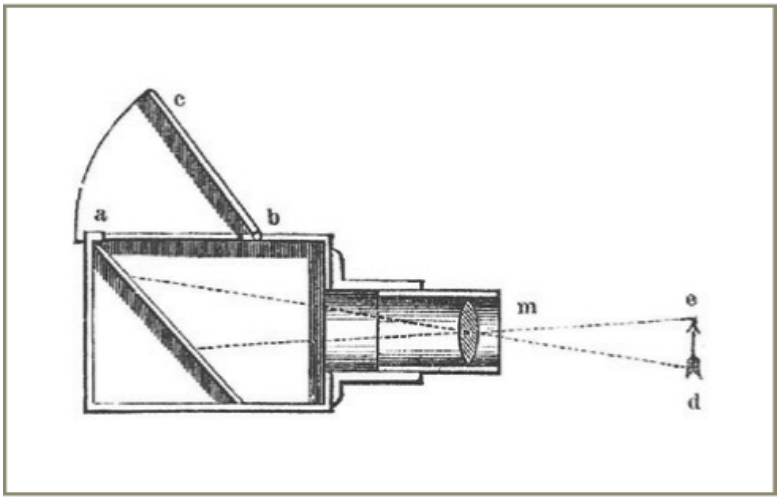


Fig. 7: The Camera Obscura

Fig. 8: Joseph Nicéphore Niépce, View from the Window at Le Gras *, Chalon-sur-Saône, 1827*

Fig. 9: Louis Jacques Mandé Daguerre, Boulevard du Temple *, Paris, 1838*

Fig. 10: William Henry Fox Talbot, Boulevard des Capucines *, Paris, 1843*

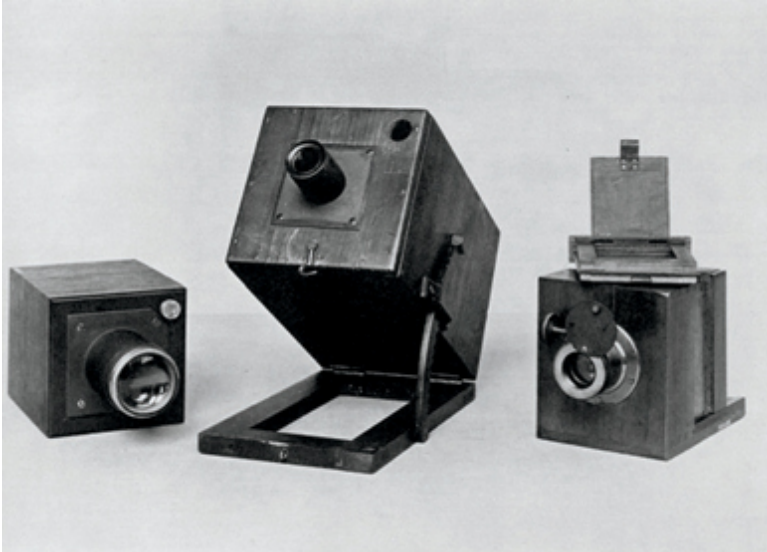


Fig. 11: Mid-19th century cameras

Fig. 12: Pierre Petit, The Building of the Eiffel Tower, Paris, 1888

Technical progress in the following years increased the quality of architectural photos, while outstanding photographers like Andreas Feininger experimented with self-built cameras. It was Feininger who developed the world's (then) largest telephoto lens, and with it a new way of taking photographs. The advent of pocket-

sized 35mm cameras prior to World War II (fig. 13) encouraged spontaneous, subjective photography, and the medium became available to the masses. The flexibility of smaller camera systems transformed the camera into a new kind of notebook and gave birth to modern photojournalism. Post-war architectural photography developed into a purely practical form of documentation, especially in Germany, and served mainly press and advertising purposes.

Fig. 13: Leica II, 1932

Artistic architectural photography began to develop as a genre toward the end of the 1950s. Artists such as Hilla and Bernd Becher systematically photographed anonymous, monumental industrial architecture, creating extensive sequences of images showing buildings in various states of decay. The idea of the documentary photo series gained worldwide popularity and blurred the distinction between “good” and “bad” architecture. Buildings that didn’t conform to the perceived aesthetic of modern architecture received just as much attention, and the advent of art galleries and the large-scale production of coffee-table books in the 1970s underscored the importance of the genre as a whole. Whether ancient or modern, grouped or free-standing, well-known or strange —, the range of potential architectural subjects is virtually unlimited.

The popular photographic boom continued toward the end of the 20th century. International exhibitions travelled the world, and prices of photographs at auction reached previously unheard-of levels. The introduction of digital technology brought with it the ability to correct image perspective and distortion—tasks that were previously extremely difficult to perform. Traditional aspects of architectural photography, such as the documentation of

construction sites, began to take on artistic aspects, giving architectural photography a twin role as an artistic and documentary medium.

The development of digital photography over the last 10 years hasn't changed architectural photography per se, but has brought about enormous changes to the methods used to perform it. Although digital technology has banished 35mm and medium format photography to the role of niche practices, large format cameras capable of producing higher quality images than their digital cousins are still in widespread use, in spite of the enormous cost involved.

1.3 Authenticity in Architectural Photos

Just like in the field of architecture itself, there are various approaches available to shoot architectural photographs, ranging from purely functional to complete artistic abstraction.

Documentary architectural photography walks a narrow path between presenting a neutral visual experience and an authentic representation of the inner values of a building (fig. 14). Here, the composition has to limit itself to communicating information—otherwise, the building will lose its central importance and the photo itself will become the center of attention.

This raises the question of whether it is actually possible to shoot 100 percent authentic architectural photos. Even the most perfect, realistic architectural photo has a certain degree of intrinsic abstraction, if only due to the artificial scale of the reproduction or the lack of a third dimension. Ergo, it is impossible to portray a building absolutely authentically using external media. Additionally, a photo can only reproduce the emotions felt by the viewer in a given situation. In other words, the way a building is perceived where it stands is often completely different from the way it is perceived in a photograph. In his essay "Medien zwischen Sein und Schein" ("Media Between Myth and Reality"), published in 2000, the architect Meinhard von Gerkan said, "An architectural photo is almost bound to be a visual lie, because the medium seems to represent the greatest possible potential objective authenticity, [...] true to the fact that a lens is an incorruptible technical device. We know it is an illusion."

Fig. 14: A documentary architectural photo

At what point does architectural photography become art, and how can we differentiate between artistic architectural photography and its documentary sibling? The transition between the two is difficult to pinpoint, but it is safe to say that art begins where the intervention of the photographer begins to influence the purely documentary nature of a photo. This is where the choice of subject is no longer intrinsically connected with the impression made by the building. A building can be the central element of an image without actually divulging its function. This process makes us increasingly independent from architecture itself, and objective representation loses significance.

Further extrapolation of this line of thought leads unavoidably to the notion that a photo of a building can have a visual impact that is completely decoupled from the nature of the building's architecture. The quality of the resulting image will then, logically, be judged on the basis of its own artistic merits, and not on the quality of the building it portrays. Using compositional techniques such as deliberate exaggeration, emphasis and omission, or simplification and distortion, we can influence the strength of specific effects to the point where the building itself becomes the photographer's plaything—a clear indication that we are, after all, dealing with art (fig. 15).

1.4 Forms of Architectural Photography

Architectural photography in various forms is part of our everyday lives.

Documentary architectural photography: Many documentary architectural photographs can be found in books, magazines, brochures, and construction documents. In these cases, architectural photography takes the form of multiple images with accompanying explanations, plans, or drawings that are designed to precisely describe a building and its attributes.

Postcard photography: Architecture is often the subject of postcards, even if the photographer's intentions and degree of precision are not the same as those found in documentary situations. Postcards often serve simply as proof that the sender was actually in a particular place. Such photos serve only as a means of recognition and are often reproduced with oversaturated colors, over-the-top effects, and scant regard for technical prowess.

Fig. 15: An artistic architectural photo

Vacation photography: Tourists often have similar intentions when they photograph churches, castles, and other landmarks. Such photos form personal memories. While architecture is part of the subject, the location is usually more important than the type of building. Interestingly, these types of photo are taken almost exclusively on vacation. In everyday situations where we live,

buildings like these are considered neither newsworthy nor photogenic (fig. 16).

Advertising photography: Architecture often plays a role in poster, magazine, and TV advertising, and is often used to enhance the apparent significance of a product. Modern architecture stands for progress, technology, high quality of life, and glamour. For example, the automobile industry uses many manipulated architectural images in its advertising, employing stylistic devices such as color adjustments, deliberate distortion, stylization, image blending, and artificial reflections.

Artistic architectural photography: Artistic architectural photographs can often be found in galleries and exhibitions, usually in the context of a particular theme or artist. Here, architecture serves only as a means to an end, with no particular connection between the message of the image and the message conveyed by the architecture itself. In this case, it is the photographer and not the architect who is the focus of the activity.

Fig. 16: Although architecture is the subject of this vacation photograph, the building is much less important than the location

2 Camera Technology

This chapter will help you to decide which equipment to use for your architectural photography. We will consider your personal requirements and intentions and how they can influence your choice of camera. We will also discuss which lenses and accessories are best suited for capturing a variety of architectural subjects.

First and foremost, we would like to stress that you don't need a lot of equipment to take high-quality architectural photos. A good photographer can make fascinating photos with the simplest of cameras, while less talented people are unable to produce quality images using even the most elaborate and expensive gear. Expensive equipment is not the key to successful architectural photos—the crucial factor is always the person behind the camera. The camera is a tool designed to help you realize a photographic idea.

The photographer Andreas Feininger once said, "The fact that a (in the traditional sense) technically deficient photograph can have greater emotional impact than a technically flawless picture probably comes as a shock to those who are naive enough to believe that technical excellence alone is a measure of a value of a photograph."

Nevertheless, a set of equipment selected for its suitability to your personal shooting style greatly simplifies the photographic process and forms the ideal basis for successful photos.

2.1 Advantages and Disadvantages of Digital Cameras

Until recently, the most important choice a photographer had to make was between digital and analog systems. Nowadays, digital technology has superseded analog equipment for virtually all types of photography. However, digital technology has its shortcomings too, and every photographer has to learn to deal with them in the course of his/her work.

2.1.1 The Number and Availability of Images

One of the great advantages of digital cameras is their ability to display results immediately. The data captured by the sensor can be instantaneously analyzed and processed. Poorly exposed images no longer represent a waste of expensive material and can be quickly analyzed and deleted. In contrast to the analog process, shooting digital photos doesn't require the purchase and use of film and no longer involves complex development or digitizing processes. Once an image file has been transferred to a computer—either wirelessly or by using a memory card—it can be immediately viewed, processed, published, or printed.

A digital memory card holds many more images than the limited number of shots analog film allows, making it (theoretically) possible to simply keep shooting until you have captured the perfect picture. For analog photographers, more photos means more time and money spent having the film processed. This apparent disadvantage can, however, make the photographer think harder about each individual shot and prevent excessive use of the shutter button. The compulsion to shoot the next free digital image can lead to hurried compositions. If they are not careful, digital photographers can easily end up producing too many images of insufficient quality.

2.1.2 Resolution and Tonal Range

Today's digital image sensors provide higher resolution than analog film with the same format. Only large format sheet film cameras used in combination with high-quality digitizing processes can offer greater resolution and better detail rendition. The sheer number of pixels built into a digital image sensor means that you are virtually unlimited in the size of the prints you can make, especially if you consider that viewing distance normally increases with the size of a print anyway.

Things look rather different when it comes to reproducing the dynamic range—i.e., the range of contrast—in a scene. Negative film can reproduce 12 stops or more of contrast and reacts less sensitively to critical, high-contrast situations. Analog material also has fewer problems than digital capture techniques in potentially overexposed image areas, and tends not to produce the burned-out highlights (fig. 17) common to digital image sensors. Digital photographers have to pay more attention than their analog

counterparts to lighting conditions and exposure settings.

Nowadays, some medium format digital backs and full-frame digital single-lens reflex (DSLR) cameras are capable of reproducing 11 or 12 stops of contrast at low ISO values, and are thus rapidly catching up with the equivalent analog processes. Skillful use of RAW processing tools (see section 4.1.1) can also help to recover details that initially appear lost in under- or overexposed image areas.

Because maximum reproducible dynamic range is directly related to the size of each pixel in the sensor, cameras with considerably smaller sensors are only capable of reproducing up to nine stops of contrast.

Fig. 17: The limited dynamic range that digital cameras (especially digital compacts) can reproduce has caused burned-out highlights in the sky (shown on the left). These areas contain virtually no image data that can be rescued during processing. A camera with greater dynamic range (due to a larger and/or higher quality sensor) reacts better in this type of high-contrast situation and gives the photographer more room to maneuver during subsequent image processing (shown on the right).

2.1.3 Image Noise and the "Look" of an Image

Compared directly, digital images appear much less noisy than

digitized analog images taken at the same ISO sensitivity. While analog film grain usually appears as uniform background noise (fig. 18), digital cameras set to high ISO values tend to produce blotchy color noise (fig. 19) alongside the more common luminance noise, and banding (fig. 20) in darker images areas. These digital artifacts are generally considered to be more distracting than analog grain effects. Therefore, most digital cameras have noise reduction algorithms built into their firmware, although this usually causes a loss of detail definition when it is switched on.

Fig. 18: Analog film grain

Noise (or a lack thereof) is a relative notion that very much depends on the individual viewer's perception, and which is often overstated when judging the quality of an image. Analog grain and digital noise are both much less irritating when viewed in a print or at reduced size on a website than when judged at 100 percent magnification on a computer monitor.

Many people consider analog images to look somehow more natural and harmonious than their often slightly sterile or artificial-looking digital counterparts. This is partly because the random arrangement of the silver halide crystals in analog film more closely represents the chaos present in nature than the strict, geometrical arrangement of pixels in an image sensor. Many analog photographers use the grain present in high-sensitivity films deliberately as a stylistic device, and there are a number of software manufacturers who offer programs and plug-ins that digitally simulate the look of analog film material.

Fig. 19: Typical digital color noise

2.1.4 Image Artifacts

For technical reasons, digital image sensors produce a number of different types of artifacts that confront photographers under various circumstances.

Fig. 20: Striped noise artifacts—an effect also known as banding

Moirés (fig. 21) occur where patterns intersect and cause interference. These appear in digital images when fine textures in the subject interfere with the pattern of pixels on the surface of the image sensor. Bayer Pattern sensors (see page 16) also produce additional **color shifts**, due to the necessity of interpolating color values from neighboring pixels (fig. 22). The geometric patterns created by the arrangement of the pixels on the sensor also cause

so-called **aliasing** artifacts, which take the form of zigzag (or staircase) patterns in diagonal lines (fig. 23). To counteract these effects, most camera manufacturers insert one or more low-pass filters in front of the camera's sensor. Simply put, these filters apply a soft focus effect to the incident light, which reduces the strength of the effects described above. This causes a reduction in image detail and the maximum sharpness the sensor can reproduce. Camera manufacturers are therefore constantly involved in developing systems that produce the best possible compromise between image sharpness and the incidence of digital artifacts. Because the silver halide crystals in analog film are of varying sizes and are arranged randomly, these problems do not occur in analog images. Another reason for the lack of artifacts in analog images is that, in contrast to the pixels in the widely used Bayer Pattern image sensors, the crystals in color film are arranged on multiple layers, rather than on a single flat plane.

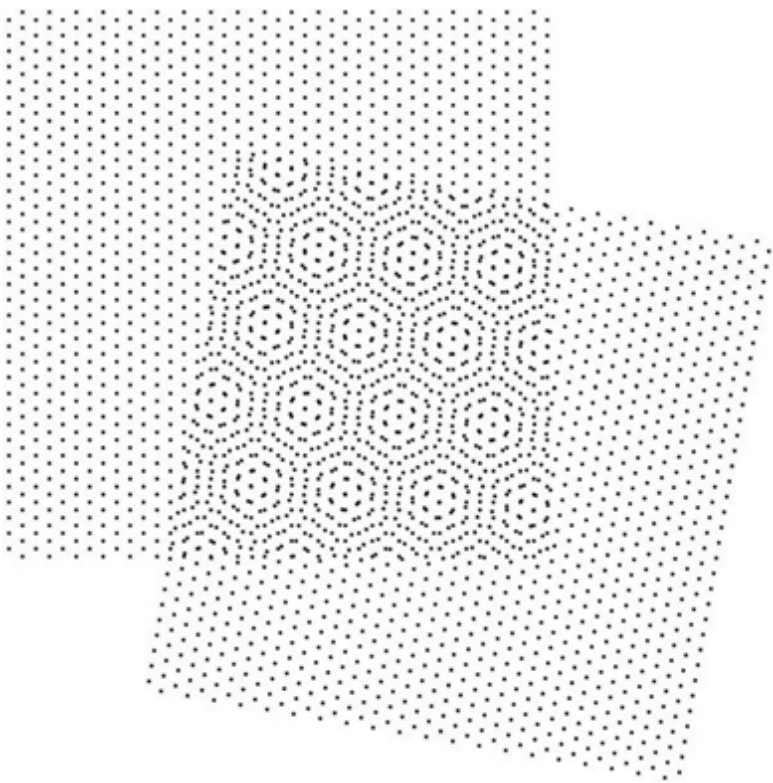


Fig. 21: Moiré artifacts caused by superimposing two patterns

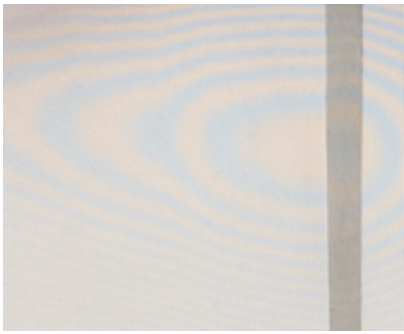


Fig. 22: Moiré and color shift effects in a digital image

Fig. 23: "Staircase" aliasing artifacts

In spite of their built-in ultrasonic dust-off mechanisms, digital cameras with interchangeable lenses are prone to getting dust and dirt stuck inside the camera body. Particles of dust that affix themselves to the image sensor often produce obvious blotches, especially in images taken using small apertures (fig. 24). The best way to avoid this problem is to clean your sensor manually, even if this does involve quite a lot of effort. Make sure you use the proper tools when cleaning your sensor if you want to avoid damaging it permanently.

Fig. 24: A dust particle on an image sensor

Although dust or hair that sticks to analog film is simply wound on with the film, analog photographers still have to make sure that there is no dust on the original or the scanner when digitizing their images, and the first processing step after scanning large format negatives is often dust artifact removal. Therefore, modern scanners for 35mm films and slides usually have automatic dust and scratch correction software built in.

Bayer Pattern Sensors and Interpolation

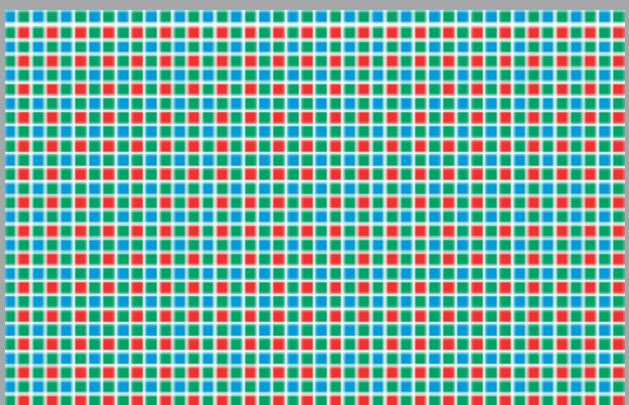
The pixels in an image sensor capture the brightness, not the color, of the individual points in a subject. To create a color image from the data captured by its image sensor, a digital camera has to produce red, green and blue color values for each pixel. The RGB color model uses different brightnesses of these three primary colors to reproduce virtually all colors that occur in nature.

Various techniques are used to convert the data captured by image sensors into color images, all of which use colored filters to create color data from the light entering the lens. So-called "multi-shot" cameras shoot three separate images of the subject and position either a red, green, or blue filter in front of the sensor while doing so. The resulting images are then merged into a single full-color image.

Conventional DSLRs have to make do with a single shot in which each pixel can capture the brightness of just one of the subject's three color components–the other two are then created using a simple trick.

The sensor pixels are coated with a matrix of red, green, and blue microfilters, and the two missing color values for each pixel are then calculated on the basis of the colors captured by neighboring pixels. This process is called interpolation.

The most widely used filter matrix pattern is the Bayer Pattern, which consists of 50 percent green and 25 percent red and blue filters. These are arranged in groups of four pixels, each of which consists of two green, one red, and one blue pixel. This predominance of green reflects the physiology and sensitivity of the human eye. The use of neighboring pixels during interpolation ensures that each pixel in the converted color image contains color data that is not actually captured by the corresponding sensor pixel.



The arrangement of microfilters in a Bayer Pattern sensor

2.1.5 Lens Quality

The rapid development of image sensors in recent years has seen a parallel increase in the demands made on camera lenses. High-resolution digital sensors react more acutely than film not only to the quality of a lens, but also to the angle of incidence of the light reaching them. Light that hits film at an angle produces no specific problems, but increases the risk of artifacts and vignetting in digital sensors, especially at the edges of the light-sensitive area. Due to the special nature of their optical construction, this effect is particularly prevalent when you are using wide-angle lenses. Many sensor manufacturers now use microlenses or concentrator lenses positioned in front of the individual pixels in the sensor to direct the incident light to the light-sensitive part of the pixel. All newer

lenses are therefore constructed with the requirements of digital cameras in mind. For some combinations of cameras and lenses, it is even possible to use software algorithms to eliminate some artifacts in-camera immediately after a shot has been taken.

2.1.6 Digital Image Processing

In contrast to analog images, all digital image processing techniques can be applied to digital images in the course of a computer-based workflow without the risk of image quality loss. Armed with the knowledge that you can correct most artifacts, anomalies, and distortion later on a computer, shooting in extreme situations suddenly becomes a lot easier. Computer-based image processing is of central importance to architectural photographers, and new techniques, such as panorama stitching (see section 4.4) and dynamic range increase (DRI) imaging (see section 4.5), give us a completely new view of our subject and make shooting in cramped spaces or under extreme lighting conditions easier than ever before.

2.1.7 Image Authenticity and Archiving

Because of the difficulties involved in manipulating them, images captured on negative or slide film are often thought to be more authentic than digital images. Most people wouldn't consider a digital image to be particularly well protected against forgery, as it is not a unique original, but instead an endlessly reproducible and manipulable collection of bits and bytes. The upside of the same phenomenon is that it's not as easy to accidentally lose a digital original, as digital technology makes it possible to save, copy, and archive your images losslessly and, theoretically, forever.

2.2 The Camera

A camera has been the photographer's basic tool for more than 150 years. This device is designed to depict everything within a certain angle of view in three-dimensional space and to capture it for posterity in two dimensions. Different types of cameras are suitable for different types of photography, and certain functions and capabilities determine whether a particular camera is suited to the

field of architectural photography.

So which camera is best for the job? You will see in the following sections that this is less a question of brand and more one of system type and sensor format.

2.2.1 Types of Digital Cameras

The cameras available for shooting architectural photos range from normal compacts with tiny image sensors, through full-frame analog or digital cameras, right up to analog large-format models.

Digital Compacts and Bridge Cameras

The smallest image sensors available today are built into **digital compact cameras**. These cameras are small and light and therefore easy to carry at all times. They are also simple to use, even for beginners. They are best suited for use in everyday snapshot situations.

Sensor size and efficiency: The greatest disadvantage of digital compacts is their tiny sensors. Large numbers of pixels packed into such a small space provide a relatively low light yield per pixel, making it necessary to artificially amplify the signals the sensor produces. This in turn reduces the dynamic range and increases the background noise in the resulting images. Noise is then combated in-camera at the cost of a further reduction in image detail.

Fixed lenses: The small, fixed lenses built into digital compacts tend to produce a relatively large number of lens errors, especially toward the edges of the frame and especially for lenses with a large zoom range or particularly compact dimensions. Fixed lenses also have a limited range of focal lengths, especially at the wide-angle end of the scale. This in particular makes digital compacts unsuitable for use in an architectural context.

Other features of digital compacts: Composition is made difficult by small view-finders and small, glossy monitors. The manual or semi-automatic exposure modes that are so important in architectural photography are rarely found, or are uncomfortable to handle, in compacts. The lack of a RAW shooting mode (see section 4.1.1) is also a serious handicap.

Even though they look a lot more like DSLRs, so-called **bridge cameras** are subject to many of the same drawbacks as compacts, including small sensor size and limited wide-angle capabilities. But, unlike compacts, most bridge bridge cameras support RAW image data formats and often have manual or semi-automatic exposure modes.

Four Thirds, APS-C, DX, and APS-H DSLRs and Mirrorless Interchangeable-Lens Cameras

Most DSLRs have sensors that are significantly smaller than the traditional 35mm image format (fig. 25), often due to the simple fact that smaller sensors are cheaper to produce.

The smallest currently available DSLR sensors are built to the **Four Thirds** standard developed by Olympus and Kodak. These have a diagonal measurement about half the size of a 35mm film frame and a corresponding crop factor (or focal length multiplier) of 2. This factor is a conceptual value aimed at helping the photographer to estimate the angle of view a lens will produce relative to the size of a 35mm frame. A 14mm lens used with a Four Thirds camera will depict an angle of view equivalent to that produced by a 28mm lens used with a full-frame camera. The focal length itself doesn't change, and the equivalent focal length is calculated by multiplying the real focal length of the lens by the crop factor (in this case, 14 x 2 = 28).

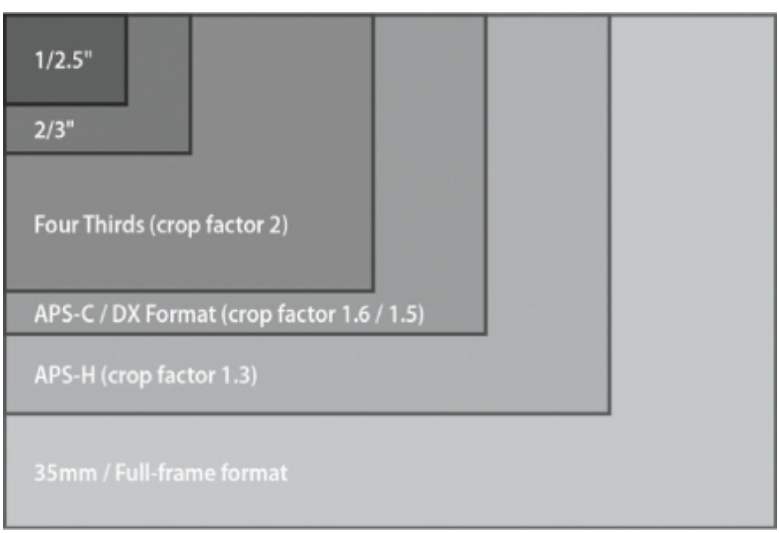


Fig. 25: The relative sizes of various digital image sensor formats compared with the traditional 35mm/full-frame format

Compared with the Four Thirds standard, the **APS-C** format used by Nikon (**DX** format), Pentax, Sony, and others has a crop factor of about 1.5, while the **APS-C** format used by Canon has a crop factor of about 1.6.

Due to the significantly smaller image circle they have to cover, APS-C, DX, and Four Thirds lenses are more compact and lighter than their full-frame cousins (fig. 26). For completeness' sake, we would also like to mention the less common **APS-H** sensor format, with its crop factor of 1.3. This format is only found in a small number of cameras and is used primarily for photojournalistic and sports applications.

Sensor size and light yield: The pixels in these types of sensors are distributed over a much larger area than those found in digital compacts, which means that each individual pixel is larger and can capture more light. This gives us greater dynamic range and better detail resolution in the resulting images. Today's multi-megapixel sensors and high-end lenses virtually guarantee high-quality images that are perfect for subsequent computer-based perspective correction.

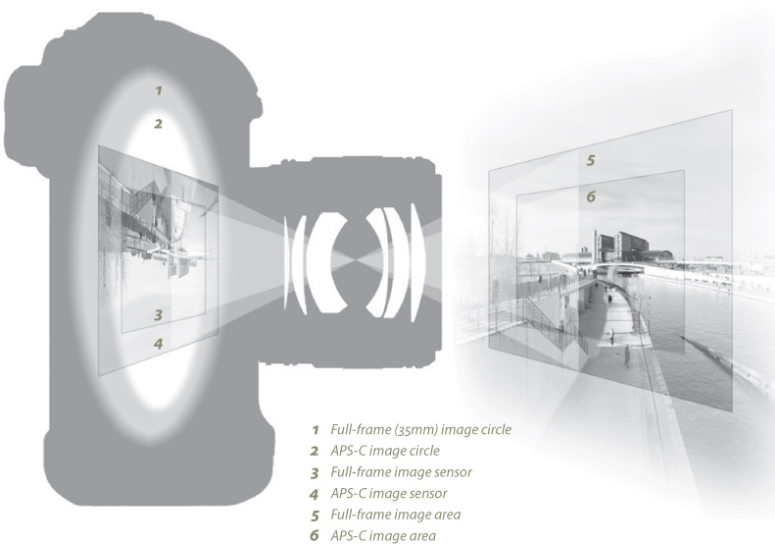


Fig. 26

Viewfinder image and live view: The large, bright viewfinders built into most DSLRs make composing architectural photos a lot easier, even in difficult lighting conditions. Unlike the optical viewfinders built into compact cameras, the mirror system ensures that you see exactly the same image in the viewfinder as the one that will be captured by the sensor. But be warned, some entry-level cameras don't have a 100 percent viewfinder image, which means that the photo you capture will actually be slightly larger than the visible frame. Live view is now virtually standard in all DSLRs and is a great aid to manual focusing, especially when coupled with a magnifier function that enlarges a selected portion of the monitor image. Live view is especially useful if you are using manual lenses and often includes live histogram functionality, which simplifies the selection of appropriate exposure settings.

Disadvantages of image sensor size: The general focal length shift toward the telephoto end of the scale caused by the crop factor is a welcome bonus for sports and wildlife photographers, but creates new challenges for architectural photographers. Full-frame tilt/shift lenses (see section 2.3.3) lose their wide angle of view when used in conjunction with smaller sensors, making them less useful than their designers intended. The same is true of many high-end, wide-angle lenses that are relegated to the role of standard lenses by the crop factor. Nevertheless, the enormous range of interchangeable lenses available today ensures that you will usually be able to find a lens that suits your purposes—a huge advantage over fixed-lens cameras.

EVIL cameras: A recent addition to the range of available cameras are mirrorless, interchangeable-lens EVIL (Electronic Viewfinder Interchangeable Lens) cameras. These models have no mirror and therefore no optical viewfinder, but have comparatively large sensors for their body size. This approach allows manufacturers to produce cameras that are hardly larger than digital compacts, but which produce images of near-DSLR quality. Cameras without mirrors allow much shallower flange depths (see section 2.5.6), making it possible—with an appropriate adapter—to use lenses from virtually any manufacturer. If you decide to take this approach, selecting a lens or an adapter with a built-in aperture ring will make life much easier. The downside of mirrorless

cameras is that you cannot check focus or framing optically using the view-finder, and using the camera monitor to check image accuracy can be tricky, especially in bright light. To counteract this problem, some manufacturers implement built-in electronic viewfinders, and some sell electronic viewfinders that can be attached to the camera's accessory shoe. These are not as clear or precise as optical viewfinders, but do offer the added advantage of built-in camera information display. While slower, contrast measurement autofocus is not a hindrance in most architectural situations, the compact size of mirrorless cameras can cause handling difficulties, as there are usually fewer dedicated controls available for making camera settings, and those that exist are often quite small. Additionally, long lenses make the complete camera/lens setup front-heavy. The compact dimensions also reduce the optical characteristics of some standard lenses to below DSLR quality and, because the sensor is completely exposed during lens changes, the risk of dust getting stuck to it is also increased.

Conclusions: In spite of some limitations, APS-C, DX, APS-H, and Four Thirds DSLRs used with wide-angle lenses are a good choice for architectural photography. There are more drawbacks to using mirrorless cameras, but these, too, are perfectly adequate in a range of situations and are a good choice for photographers who want to pursue architectural photography at a hobby level without having to make too large an investment in specialized equipment.

Analog and Digital Full-Frame Cameras

The 35mm analog format: Fixed, non-wide-angle lenses make analog 35mm compact cameras completely unsuitable for architectural photography, so they do not form part of our overall considerations. In contrast, in spite of the cost of buying, processing, and digitizing the photographic film, analog SLR cameras are a workable option for taking architectural photos. The unique look of analog images is often a welcome change for photographers who have hitherto only taken and processed digital photos.

The digital full-frame format: In the digital sector, manufacturers including Canon, Sony, and Nikon all offer full-frame (or FX) format DSLRs with sensors that are the same size as a traditional

35mm film frame. The 1:1 focal length equivalence means that you don't have to get used to dealing with crop factors and equivalent focal lengths, and you can use tilt/shift lenses with their intended angles of view (see section 2.3.3). Please note: all lenses that are not explicitly built for use with full-frame cameras (Canon EF-S, Nikon/Tokina DX, Sigma DC, Sony DT, and Tamron Di II), can only be used with full-frame cameras under certain circumstances. Some optical elements in non-full-frame lenses protrude too far into the camera's mirror box, and the smaller image circles they produce usually cause severe vignetting (see fig. 26).

The viewfinder image: Larger image sensors require the use of larger reflex mirrors and viewfinder prisms, usually resulting in a large, bright viewfinder image that, in combination with a physical or virtual grid pattern, makes precise image composition much easier.

Sensor size and light yield: The size of each individual pixel in a full-frame sensor is significantly greater than that found in APS-C, DX, or Four Thirds sensors, which improves the reproducible dynamic range, noise characteristics, and basic per-pixel sharpness. The pixels that make up a 20-megapixel full-frame sensor are still larger than the pixels found in a 10-megapixel APS-C sensor (fig. 27).

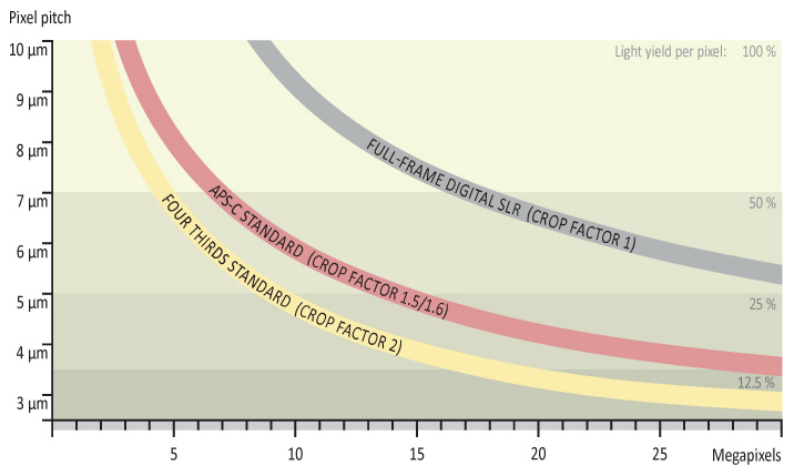


Fig. 27: Comparison of pixel sizes: light yield per pixel

Disadvantages of the full-frame format: The full use of the image circle means that lens errors occurring toward the edges of the frame are more obvious, especially when you shoot at wide angles and/or at a wide aperture. These take on the form of distortion, vignetting, chromatic aberrations, or blurred details (see fig. 31). To get the best out of a large sensor, we therefore recommend that you use the best quality lenses you can afford. Because full-frame sensors are expensive to produce, cameras incorporating them are also more expensive than models that use smaller sensors. If you are on a limited budget, it therefore makes more sense to use a less expensive camera with a smaller sensor and spend more on your lenses than it does to use an expensive full-frame camera with low-quality lenses.

Conclusions: If the quality of the lenses you use matches that of the camera, a full-frame DSLR is an ideal tool for architectural photography.

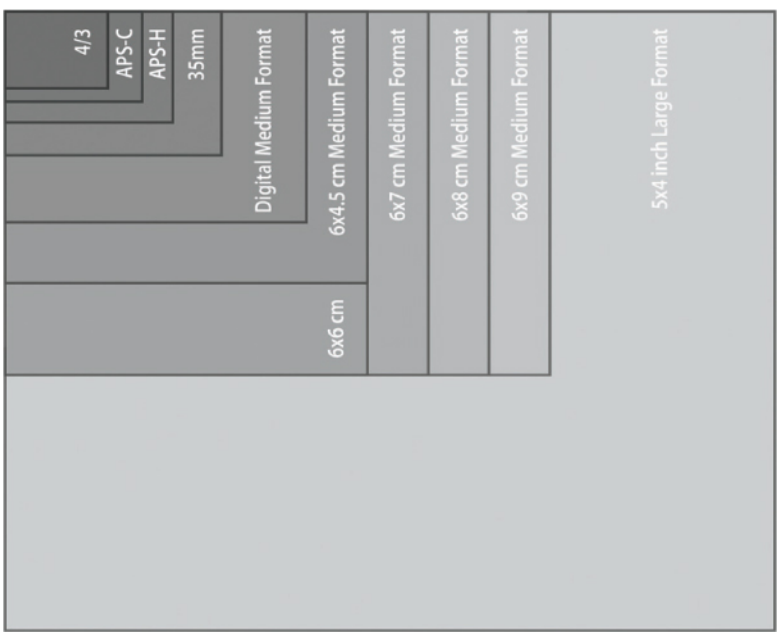


Fig. 28: Image sensor and film formats shown to scale

Analog and Digital Medium Format Cameras

Medium format cameras have always been less common in an

architectural photography context than they are in studio or fashion photography. This is due primarily to the fact that the construction of large format cameras makes them better for correcting perspective errors than their medium format cousins.

Analog medium format cameras use roll film with a larger surface area per frame than 35mm (full-frame) cameras (fig. 28), resulting in a kind of reverse crop factor. For example, a 35mm medium format lens covers an angle of view that is equivalent to ultra-wide-angle for a full-frame camera. Compared with 35mm film, the increased surface area of medium format stock improves potential detail resolution and overall image quality. But again, these advantages are gained at the price of increased material, processing, and digitizing costs. Medium format cameras are usually constructed in module form and consist of a mirror box, waist-level or pentaprism viewfinder, film holder (or back), and a lens. In contrast to 35mm cameras, most medium format models are fully manual, although increasing numbers of autofocus models are beginning to appear. Because they are heavier, slower, and less flexible to use, medium format cameras are hardly ever used for action, sports, or wildlife photography.

A new development in recent years has been the introduction of ultra-high-resolution **digital backs** for medium format cameras (fig. 29). Medium format image sensors have about twice the surface area of their full-frame equivalents and a diagonal measurement that is about one-and-a-half times as large. Medium format sensors are nevertheless a lot smaller than a traditional 6 x 6 film frame, for example, and therefore only capture a small portion of the image circle produced by the lens. In turn, this means that the widest wide-angle lenses available for medium format cameras produce images with narrower angles of view than the shortest equivalent full-frame focal lengths. Together with the lack of available wide-angle tilt/shift lenses, this situation makes medium format cameras a less viable alternative for use in architectural photography.

Fig. 29: A medium format digital camera

Large Format Cameras

Large format analog cameras have no digital equivalent and still represent the crème de la crème in the architectural photography arena. They work on a principle that is almost as old as photography itself and are also still used in product and advertising photography. These specialist tools are usually mounted on an optical bench or monorail (fig. 30) and are perfect for making perspective adjustments to an image during composition. The purely manual approach required when using large format cameras makes them much more time-consuming than other systems. They possess neither automatic exposure metering nor autofocus and their skilled use mirrors the skills required of a photographer 100 years ago. However, this lack of flexibility plays only a secondary role in the context of architectural photography because the extreme detail resolution and wide angles of view are unparalleled. One of the major drawbacks of large format work is the high cost of film and processing, which can run to $50 and more for a single exposure.

Digital sensors in large format sizes are practically unheard-of due to the astronomical costs involved and the virtually nonexistent market. As an alternative, it is possible to attach some medium format digital backs to large format cameras, although the relatively small surface area of the sensor requires the use of ultra-wide-angle lenses when shooting architectural photos. Nowadays, manufacturers such as Rodenstock and Schneider/Kreuznach

produce large format lenses that are specially designed for use with digital image sensors but which nevertheless allow wide-ranging perspective adjustments. Such lenses have focal lengths from 35mm (24mm full-frame equivalent) to ultra-wide 23mm. For lenses with focal lengths of less than 35mm, the narrow image circle no longer allows you to make effective perspective corrections using shift movements.

Fig. 30: An analog large format camera

Again, for completeness' sake, we feel we should mention **scanning backs**, which, when inserted into a large format camera like a film holder, capture the image line by line like a scanner. Needless to say, the lighting conditions and the subject mustn't change during the scanning process, which is why this technique is usually used only for scientific or art reproduction purposes.

Conclusions: Digital large format architectural photography, too, has its drawbacks, not the least of which are the very high costs of equipment and processing. The cost of a high-end large format camera can be hard even for professional photographers to justify, as every camera has to be amortized at some point. Whether digital large format photography will take hold in the architectural arena

is not yet certain, and it will require the development of either larger image sensors or more ultra-wide-angle lenses that allow greater shift flexibility before widespread acceptance can take place. Many professional architectural photographers use a full-frame digital camera as an additional tool alongside traditional large format equipment.

2.2.2 Conclusions Regarding Cameras

The considerations detailed above show that there is no ideal choice of camera for use in architectural photography, and every system has its strengths and weaknesses. Professionals are still hoping that a flexible, large format digital solution will be developed. For now, many pros continue to use large format film which they later digitize, while others have already switched to using full-frame digital cameras with tilt/shift lenses or correcting perspective and converging verticals using image processing software. Currently, full-frame digital is the most flexible system available for shooting photos of buildings. It fulfills all of the genre's basic requirements regarding sensor size, dynamic range, availability of wide-angle lenses, manual exposure settings, viewfinder quality, low running costs, etc. For hobbyists and advanced photographers on a budget, DSLRs with smaller sensors are a useful, lower-priced alternative. Analog SLRs still have their devotees too, although it is nowadays virtually impossible to use the resulting images without digitizing them first. One thing is certain: digital and analog compact cameras are not suitable for architectural photography, as they offer neither wide-angle lenses nor sufficient image quality and handling flexibility.

2.3 Lenses

The lens you use largely determines the angle of view you can capture, the sharpness of detail, the minimum depth of field in your image, the permissible shutter speed, and the degree to which lens errors are visible in the finished image. In short, the lens dictates image quality. If weaknesses in the construction of the lens mean that certain details don't reach the sensor, these simply cannot be captured. Most currently available analog and digital SLR bodies are suited to architectural use, but more care is required when

choosing a lens.

While sports photographers require long telephoto lenses with fast autofocus, and portrait photographers prefer medium telephotos with good detail definition at wide apertures, a lens that is to be used for architectural photography has to provide extremely good reproduction characteristics, an appropriate angle of view, and the ability to tilt and/or shift.

2.3.1 Reproduction Characteristics

Architectural photography requires the use of lenses that provide consistent reproduction with minimum lens errors and anomalies (fig. 31).

The large size of the subject, the wide angles of view, and the relatively large subject distances mean that selective focus doesn't play a significant role in our considerations. Especially when shooting for documentary purposes, architectural photographers need to be sure that the entire subject is captured in sharp detail. For this reason, we often shoot with the lens stopped right down—a technique that also reduces vignetting effects, chromatic aberration (color fringing), and softness at the edges of the frame. Fringing and some softness are almost impossible to completely avoid, even at very small apertures. While chromatic aberration can be effectively counteracted using software tools, the edges of photos often remain less sharp than the center, especially if they were shot using cheap or mid-range lenses. The distortion that a lens produces is independent of the aperture you use, and both barrel and pincushion distortion are more evident at the extreme wide-angle and telephoto ends of the zoom scale. It is therefore important to compose your image with enough space around the subject to allow effective subsequent distortion correction.

Fig. 31: Lens errors (from top left to bottom right): Vignetting, chromatic aberration, edge softness, barrel distortion

It is often said that the simpler optical construction of fixed focal length lenses generally produces better image quality than more complex zooms. This is, however, not always true, especially if we compare the image quality produced by older, analog fixed focal length lenses with that produced by newer zooms that are designed specifically for use with digital cameras.

As long as the lens produces results of adequate quality, it is immaterial whether you use a fixed focal length or a zoom to take architectural photos. Price is often a good indicator of the quality you can expect to achieve; more expensive lenses are often constructed with better optical quality than entry-level or mid-range lenses. Don't scrimp in the wrong place if you can help it—a cheaper camera with a more expensive lens is nearly always a better choice than the other way around.

2.3.2 Focal Length

In general, architectural photography requires the use of a range of wide-angle lenses that capture a greater angle of view than standard or telephoto lenses. This also means that objects appear smaller on the image sensor or film. Ultra-wide-angle lenses are those with an equivalent focal length of 24mm or less and an angle of view of more than 84 degrees (fig. 32).

If all buildings were constructed in an open environment with no irritating surroundings, we could, theoretically, take all of our architectural photos using one medium wide-angle lens. We could simply move around until we find the best possible viewpoint for a shot. However, in reality, the opposite is nearly always true, and the choice of places from which a building can be successfully photographed is extremely limited. Most of the buildings we want to photograph are located in densely developed urban environments, and we can only take photos from the surrounding streets and squares. Optimum shooting locations are often inaccessible. Additionally, street signs, lamps, and vehicles intrude on a composition, so it is important to be flexible in your approach. This often means moving closer to the subject and using a shorter focal length lens.

In exterior situations, we usually use lenses with focal lengths between 20 and 35mm (fig. 33), while interior situations normally require focal lengths between 14 and 24mm (fig. 34). A short telephoto lens is also a great additional tool for capturing details of a building or shooting from greater distances. A useful architectural photography kit will therefore include lenses ranging from ultra-wide-angle to medium telephoto. Ideally, you will also include a tilt/shift lens or two in the mix.

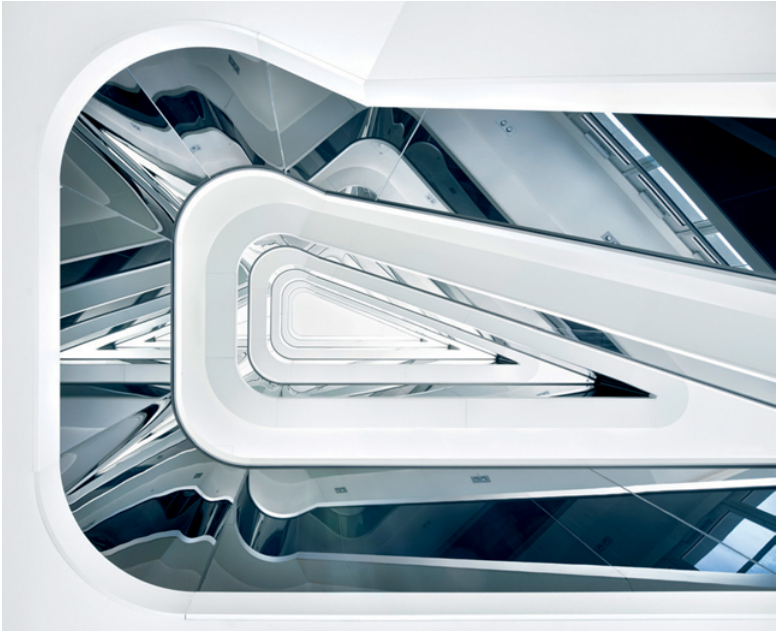


Fig. 32: 12mm full-frame, ultra-wide-angle interior shot

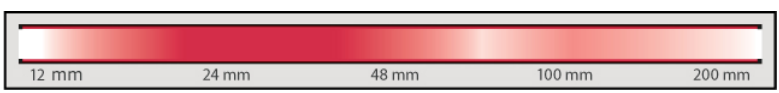


Fig. 33: The frequency of use of various focal lengths in exterior situations (full-frame equivalent)

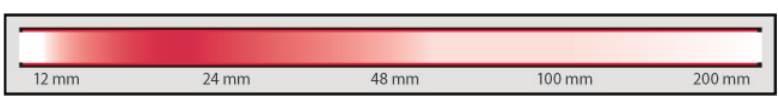


Fig. 34: The frequency of use of various focal lengths in interior situations (full-frame equivalent)

Fig. 36: Converging verticals in this scene were prevented by using a 24mm tilt/shift lens

2.3.3 Tilt/Shift Lenses

Tilt/shift lenses (fig. 35) allow the photographer to make physical adjustments to the perspective in an image while shooting. They can be used to prevent the occurrence of converging verticals (see section 3.4) and obviate the need for various quality-reducing correction steps during subsequent image processing (fig. 36). They also make it easier to compose images, as they give the photographer more freedom in the choice of standpoint and framing. Tilt/shift lenses allow you to create perspective-corrected two- to four-shot panoramas with increased angles of view and resolution (see section 3.6.3). Apart from aperture control, these lenses are usually fully manual and thus require you to select distance settings by hand.

Fig. 35: A 17mm full-frame wide-angle tilt/shift lens

2.4 The Perfect Camera/Lens Combination for Every Budget

Beginners: If you are a complete beginner, or if you are stepping up from a compact camera, an entry-level DSLR in a bundle with a kit lens is a good starting point. All major manufacturers offer such kits for $750 or less, and they are a great way to take your first steps in architectural photography. Interchangeable lenses make it simple to upgrade your system later on.

Hobbyists: For photographers who want to deepen their experience of architectural photography, we recommend the purchase of an additional ultra-wide-angle zoom lens. These lenses generally cost around $500 and open up a whole new world of possibilities, especially in interior situations.

Ambitious amateurs: If you are really serious about coming to grips with architectural photography, you should get hold of a mid-range DSLR, a ultra-wide-angle zoom lens, and a high-quality, mid-range zoom with a range that extends up to short telephoto. Selected fixed focal length lenses can also make useful additions to a setup like this. But remember, you can easily spend $2,500 or more kitting yourself out this way.

Semi-pro: Photographers who are already experienced in various areas and who want to progress in the architectural arena should

consider acquiring a full-frame DSLR and a set of high-end zoom and fixed focal length lenses. A tilt/shift lens is also a useful addition to any full-frame kit, and a 24mm model is a good starting point. At this level, you can easily spend several thousand dollars on your equipment.

Professional photographers: For most pros, the best is just about good enough. This usually means large format cameras with medium format digital backs supplemented by a top-of-the-line, full-frame DSLR and high-end, wide-angle lenses. Most pros have one or more tilt/shift lenses with them at all times, and sometimes use shift adapters to combine medium format lenses with their everyday camera bodies. Here, the costs quickly reach five figures.

2.5 Accessories

The requirements for every architectural photographer don't stop at just camera and lens—some accessories are essential and many others make life a whole lot easier. The following sections describe some of the things you can usefully add to your collection of gear.

2.5.1 Choosing a Tripod

A tripod is a fundamental part of every architectural photographer's kit. It is responsible for helping to deliver sharp, shake-free images, especially in low-light situations, whether indoors or out. But in daylight situations, too, gray filters and small apertures can increase shutter speeds to levels at which a tripod is indispensable. You can, of course, shoot handheld whenever circumstances allow, but remember that a tripod is also a great aid to aligning your camera, and the steady viewfinder image a tripod-mounted camera delivers also helps when composing an image. Using a tripod, you have more time to make precise adjustments to your framing and to wait for the right moment to release the shutter. This way, you can simply wait until all the elements of your image (clouds, vehicles, passersby, etc.) are in the right positions and then release the shutter at leisure.

Always use a stable tripod and make sure that you are not using it to the limits of its load capacity. If your camera is too heavy, even light winds can cause camera shake. Maximum mobility is not as

important for architectural photographers as it is in other fields, so don't worry too much about the weight of your gear. We can recommend tripods made by Gitzo, Really Right Stuff, or Berlebach if you can afford them, or by Manfrotto if you are on slightly tighter budget.

Fig. 37: A high-end ball head and quick-release plate mounted on a tripod

2.5.2 Choosing a Tripod Head

The head you use is just as important as the tripod itself. Many heads are available separately, making it easier to choose exactly the right model for your individual purposes. The basic types are ball heads (fig. 37) and pan/tilt heads (fig. 38). Ball heads require the movement of just a single grip to move them in any direction and are consequently very quick to align. In contrast, pan/tilt heads do not have the same agility and ease of use, but their separated planes of adjustment are more precise and allow the most miniscule adjustments. As always, the system you prefer is a matter of personal taste.

Fig. 38: A conventional pan/tilt head with a built-in quick-release plate

As with your tripod, using an inferior-quality head can quickly cause frustration, especially if it slips once you have set it up. A ball head that you can't properly lock makes aligning your camera a game of chance, so avoid purchasing cheap tripod/head bundles if you can. The best tripod heads are manufactured by Arca Swiss, Linhof, Markins, and Really Right Stuff. Saving money by purchasing a low-quality tripod will only lead to a fresh investment further down the line. Spending $200 or more on a tripod and about $150 on a high-quality head should ensure you years of trouble-free shooting. If this seems like a lot to you, just compare it with the total cost of your other camera gear and view it as a long-term investment in your photographic future.

Quick-release plates and clamps (fig. 39) are a great option, and save a lot of time and effort when mounting and removing your camera from your tripod. Many tripods come with their own proprietary quick-release plate built in, although the Arca-Swiss system has become something of a standard in professional photographic circles.

Fig. 39: A quick-release clamp

For photographers who shoot a lot of portrait-format images, an L-bracket can also be a worthwhile investment. L-brackets are not

cheap, but greatly simplify the switch from landscape to portrait format while keeping the center of gravity of the camera/lens combination directly above the center of the tripod (fig. 40). L-brackets are available in generic form or as custom models designed to keep the controls and contacts for specific camera models free and easy to access. Panorama enthusiasts require their own special panorama heads (or *nodal point adapters* as they are often called; fig. 41), which are designed to preserve perspective and simplify camera alignment while shooting in the round.

Fig. 40: L-bracket

2.5.3 Remote Release

Used in combination with a stable tripod and your camera's mirror lockup function, a remote release is the final link in the chain of tools that ensure shake-free photos. You need to be able to shoot perfectly superimposed source images to create effective HDR (high dynamic range) or DRI images (see section 3.9.5), making a perfectly stable camera setup essential. Even pressing the shutter button can cause the camera to shift by a few pixels, which is where remote releases come into play. They are available in cable form or as radio and infrared controlled wireless versions, and some older SLR cameras even work with mechanical Bowden cables. Manufacturers' own remote releases (fig. 42) are often more expensive than third-party solutions, although these are usually just as good.

Fig. 41: A panorama head for shooting spherical panoramas

Fig. 42: A wired remote shutter release

If you don't have a remote release on hand, you can also use your camera's self-timer function to release the shutter without touching the camera. The disadvantage of this approach is that you cannot precisely determine when the shutter fires. Many wireless remote releases send an additional focus command to the lens before firing the shutter, so if you want to be sure that your focus setting stays put, you should deactivate autofocus before taking your shot.

2.5.4 Lens Hoods

A lens hood (or *sunshade*, fig. 43) is an important accessory that

should be packaged with every lens. Unfortunately, this is not always the case, and accessory lens hoods are often quite expensive. They are designed to prevent stray light from entering the lens while not causing additional vignetting effects of their own (fig. 44). Unless you are using filters, there is no reason not to leave a lens hood attached to your lens at all times. Even at night, a lens hood can prevent light from streetlights or passing cars from spoiling a shot, and also protect the front element of the lens from dings, scratches, and the weather. If you do use a lens hood, make sure it is correctly locked into place, as a misaligned hood can cause unwanted shadows at the edges of the frame.

Fig. 43: A "tulip" lens hood

Fig. 44: A lens hood would have helped to block the sunlight and prevent the lens flare that is clearly visible in this image

2.5.5 Filters

Because of the ease with which we can apply effects to digital photos, recent years have seen a significant decline in the use of lens-mounted filters. However, some filter effects cannot be simulated digitally, and these are the filters that are still frequently used in architectural situations (see section 3.10).

Polarizers: These filters (fig. 45, left) only transmit light that oscillates in the plane the filter is aligned to. They are used to suppress unwanted reflections from smooth, non-metallic surfaces such as window-panes or water, or to intensify the blue of the sky in areas at a 90-degree angle to the sun. They also increase the contrast between white clouds and blue skies. It is preferable to use circular polarizers with SLR cameras, as only these work correctly with the camera's exposure and autofocus systems. The strength of the polarizing effect is regulated by rotating the foremost ring on the filter.

Graduated filters: The most practical shape for a graduated filter is either square or rectangular. They are mounted in a special holder that is attached to the front of the lens and allow you to selectively darken a chosen portion of the frame (fig. 45, right). This effect is particularly useful for balancing exposure in the two halves of high-contrast scenes, such as a landscape view with a dark foreground and a very bright sky. For our purposes, the most useful filters are those that do not darken in a linear way from the lower edge, but rather begin to darken in the middle and have a progressively darker tint toward the upper edge.

Fig. 45: Circular polarizer (left) and a square graduated filter mounted in a holder (right)

Neutral density filters: Neutral density (ND) filters (fig. 46)

reduce the intensity of the light entering the lens by a predetermined amount, allowing you to use longer shutter speeds than would otherwise be possible. They are available in various densities in a range between one and 10 f-stops or more. A common use for ND filters in an architectural context is to create motion blur in brightly lit situations. We tend to use 3-stop to 6.66-stop ND filters, which correspond to density values of 0.9 and 2 respectively.

The better the quality of filter glass and its coating, the lower the risk of reducing overall image quality. The best filters we know of are manufactured by B+W, Hoya, and Heliopan.

Fig. 46: A neutral density (ND) filter mounted on a lens

2.5.6 Lens Adapters

Many DSLR owners assume that they will only be able to use lenses made by the camera manufacturer or compatible third-party lenses from well-known manufacturers like Sigma, Tamron, or Tokina. However, lens adapters allow you to attach older, manual lenses with M42, Olympus OM, Pentax K, Contax/Yashica, Leica R, or medium format mounts to various DSLR bodies (fig. 47). When used with contemporary DSLRs, Zeiss or Leica lenses, especially,

can often produce better quality images than many modern high-end lenses.

Adapted lenses have to be focused manually, which can be a problem without the use of a split-image focusing screen. Recently, adapters have appeared with built-in focus-confirm chips. These allow the appropriate focus indicators to light up in the viewfinder when correct focus is achieved. You can also use the magnifier function in combination with your camera's live view mode, which greatly simplifies focusing for stationary subjects.

Adapted lenses do not transmit aperture data to the camera, so any lens you use needs to have its own aperture ring. You then have to focus with the aperture wide open before stopping down to the working aperture and metering exposure using your camera's built-in light meter. Once you have taken your photo, you have to reopen the aperture to focus your next shot. Of course, this all takes time, but is not a major hindrance in most architectural situations.

Fig. 47: Mount adapter for the use of other systems' lenses

Not all lenses can be adapted to work with all types of camera bodies. If the flange focal distance (i.e., the distance between the front of the lens mount and the sensor) is too large, the adapted lens will no longer be able to focus at infinity. This means that cameras with an especially large flange focal distance (such as Nikons) or lenses with an especially small flange focal distance (such as older Canon FD lenses) have particular limitations in terms of adaptability. If you really want to use unusual camera/lens combinations, you either have to simply do without an infinity focus setting or use a special adapter with additional built-in optical elements. The latter option can, however, lead to a reduction in overall image quality. Due to their short flange focal distance and

the large diameter of the bayonet opening, Canon EOS DLSRs are most easily adaptable cameras (besides, of course, the EVIL cameras; see page 21) on today's market.

2.5.7 Grid Focusing Screens

As an aid to composition (see section 3.8) and camera alignment, many cameras have built-in electronic grid lines that can be displayed as part of the monitor image. If your camera doesn't have such a function, you can replace its standard focusing screen with one that has a permanent grid etched onto its surface. The vertical and horizontal lines give you a useful reference for lining up the edges and features of a building and automatically prompt you to hold the camera level, often reducing the amount of image processing you have to do later (fig. 48).

Fig. 48: The viewfinder produced by a grid-type focusing screen

2.5.8 Memory Cards

Changing shooting conditions make it difficult to judge in advance how many shots you will need to take to complete a job. There are days when it seems the pictures almost want to jump into camera on their own, while on other days all the pictures seem to be hiding. Always make sure you have a sufficient number of memory

cards (or films) with you. If you like to shoot panoramas (see section 3.7.1) or HDR/DRI images (see section 3.9.5), the multiple shots necessary to create each image quickly use up memory. RAW format image files often use more memory than you think, and files of 20 MB and more quickly eat up the available space. It can be useful to save additional JPEG copies of your images to make sorting them easier, but these too take up additional space on your memory media. Today's cheap prices make carrying spare memory cards a must.

2.5.9 Batteries

Always keep a spare battery charged and ready to use, especially in situations with no easily available charging facilities—and remember, the capacity of rechargeable batteries is reduced in cold weather. Excessive use of the monitor and/or live view quickly drains a camera's batteries, as does the use of an image stabilizer, whether it is lens or camera-based. If you find your battery running down with no opportunity to recharge or replace it, switch off your camera's automatic sensor cleaning function and automatic monitor playback function. Switching the camera off between shots also helps to preserve power. An accessory battery grip with an additional portrait format shutter release button is a good alternative power source and, in an emergency, most battery grips can also be powered using conventional batteries purchased from a nearby store. A battery grip also improves camera handling for handheld portrait format shots.

Fig. 49: In this photo, the otherwise unlit foreground has been brightened using off-camera flash

2.5.10 Flash

Flash is not used very often in architectural photography. Even the most powerful flash systems are too weak to illuminate the entire exterior of a building, while off-camera accessory flash is used in

interior situations—usually in conjunction with reflectors or other light shapers—to provide accents or brighten areas that are not illuminated by natural or artificial light (fig. 49). Built-in pop-up flash or flash units mounted on the camera's flash shoe have no practical use in architectural situations. Most architectural lighting is carefully planned during construction and therefore looks more natural without the use of artificial highlights anyway. Merging multiple images from a bracketing sequence using DRI techniques (see section 3.9.5) is a better way to enhance lighting accents.

2.5.11 Other Accessories

Other useful and inexpensive accessories include rain covers and blower brushes for cleaning your sensor and lenses. Just in case dust or dirt stick to the inside of your camera, it is a good idea to carry some sensor cleaning wands with you. A two- or three-way spirit level with a foot that fits into your camera's flash shoe is a great little tool for ensuring precise camera alignment. A high-quality strap with sufficient padding and a pocket tripod (fig. 50) for spontaneous use on walls or tabletops both save hassle on long photo tours. And, if you find you cannot get quite the right view using the camera monitor, an angle finder is also a very useful accessory when circumstances demand that you position your camera very close to the ground.

To conclude: The importance of every accessory becomes most obvious at the moment you need it but don't have it with you.

2.6 Creative Tips and Tricks

The following sections are intended to give you a few ideas for increasing the level of creativity in your architectural photos.

Fig. 50: A pocket tripod

2.6.1 Lensbaby Lenses

Lensbaby accessory lenses are available in a wide range of types that are all designed to apply selective focus in one way or another (fig. 51). They allow you to produce creative focus effects in a similar way to tilt/shift lenses, with objects at the “sweet spot” in sharp focus while surrounding objects and scenery remain blurry. Lensbaby optics are not intended to produce really high-quality images, but rather to encourage artistic use of the optical characteristics embodied in the lens.

Fig. 51: A third-generation Lensbaby

2.6.2 Black-and-White Film

A particularly creative approach to photographing buildings involves using black-and-white film (fig. 52) or simulating it digitally, either in-camera or during image processing.

Monochrome images offer increased potential for the interpretation of a scene and, under certain lighting conditions, contrasting colors can end up producing exactly the same gray tone when converted to black-and-white. This loss of visual information often gives monochrome images a more abstract look, making the shapes and structures in a building a perfect playground for visual experiments. Even in the digital age of bubblegum colors, monochrome images still haven't lost their appeal. Many people perceive black-and-white photos as having a special, more personal touch—an effect that can be enhanced by the grain effects produced by high-sensitivity film. Black-and-white photography becomes especially interesting if grain is deliberately used as a stylistic device (fig. 155); the age of the building in question is then only of secondary importance. Regardless of its subject, a good monochrome photo immediately attracts the viewer's attention.

Fig. 52: 400 ASA black-and-white film

2.6.3 Fixed Focal Length Lenses

The additional brightness offered by fixed focal length lenses is less significant in architectural photography than in other genres, and a

lot of people think this doesn't really compensate for their lack of adjustable focal length. It is nevertheless instructive to use just one or two fixed focal length lenses for a couple of sessions, as this forces you to pay more attention to the intricacies of your immediate surroundings. You will need more time to find exactly the right viewpoint, and you are sure to find yourself considering more alternatives. This sharpens your eye for your subject and helps you to become more familiar with your own approach to shooting. At the end of a day's work, most photographers find that using fixed focal length lenses is not as limiting as they initially expected.

3 Shooting Techniques

This chapter addresses the "how" of architectural photography, and discusses all the aspects of a photo that have to be considered during the shoot. A whole range of factors influence the look of an architectural photo, from things you can regulate (such as your own behavior), to things you cannot influence at all, like the weather and the ambient light. We will also show how different approaches to a shoot can produce very different results. You can portray a building in an immediate, authentic way, as a more diffuse representation that has little to do with the original purpose of the structure, or even as a completely independent piece of abstract art.

3.1 What Makes a Great Architectural Photo?

A successful architectural photo depends on a well-thought-out composition and a clear form of expression. If a building is to be the central element of an image, there should be no other major elements that compete for the viewer's attention. If, however, an image is designed to portray the relationship between two buildings, the relationship has to be unequivocally illustrated to be effective. If you deliberately bend the rules of photography—as is often the case in artistic architectural shots—you have to make sure that this artifice is clear at first glance so that the viewer isn't led to believe that the photographer simply wasn't in control of the situation.

Fig. 53: A documentary architectural photo with a clear, uncluttered composition

Fig. 54: A modern architectural photograph that includes elements of the building's surroundings in its composition

A great documentary architectural photo captivates the viewer and communicates a clear, uncluttered message that immediately conveys familiarity with the building, even if the viewer doesn't

actually know it. It will also be composed entirely to serve the purpose of observation and to emphasize the quality of the building's design (fig. 53).

Modern documentary photography often includes aesthetic elements that are designed to soften the otherwise sterile look of the photo and to give the viewer the opportunity to develop a more authentic, personal feel for the building (fig. 54).

An artistic architectural photo is judged by the strength of its visual impact and has less to do with the inherent qualities of the building itself. Successful artistic architectural photography grabs the viewer's attention, tells a story, visualizes contradictions, and raises awareness of an architectural environment that would otherwise be only subconsciously perceived (fig. 55).

However, the way an individual image is perceived is still a matter of personal taste. While an architect may aim to impress the public with a clear-cut, shadow-free façade, a photographer may find the interplay of light and shade the most interesting part of the design. A viewer who is inexperienced in both professions may be impressed by an extraordinary effect on an ordinary department storefront, or may find pleasure in just recognizing a familiar building.

Fig. 55: An artistic architectural photo with a message that is independent of the structure of the building

Architects and Photographers: Different Ways of Seeing

The needs and desires of photographers and architects unavoidably collide in the world of architectural photography. Although both professions qualify as arts, architects and photographers tend to see things very differently.

An architect designs and forms three-dimensional spaces, while a photographer is concerned with only two dimensions. An architect views a concept and a design as a constant that lasts over time, whereas a photographer is more concerned with the interplay of light and shade and the subjective effect of a building's design at one particular moment.

Architects like to see photos that contain a maximum of visual information and that convey the dimensional and tactile effects of the structure in a pure, unadulterated fashion. A photographer's interpretation can use framing and composition to produce a very different impression of the same building—an impression that can be seen by the architect to have a negative effect on the informational nature of the image.

The fact is, every architectural photo represents an interpretation that can, from an architect's point of view, endanger the authenticity and informational nature of a building's appearance. This contradiction makes it especially difficult for an architectural photographer to satisfy both parties with a single photo.

Fig. 56: In this example, the building is the dominant, central element of the image

3.2 The Role of Architecture as a Photographic Subject

The central element of every architectural photo is the building. The sheer size of buildings makes them very different from almost every other type of photographic subject. An architectural photographer can not only photograph the subject from outside, but can also step into the subject and capture images of its inner life. Additionally, a building is immovably connected to its environment, which means that the photographer always has to make the effort to visit the subject.

Typically, all elements surrounding a building play a secondary role in the composition of an architectural photograph, resulting in an image with an unequivocal message (fig. 56). The significance of

each individual building in images that contain more than one major structure can vary. Sometimes, a single building will dominate due to its size or central position, while at other times, the arrangement of multiple structures can give each a similar weighting within the overall composition (fig. 57). This is often the case when several buildings form a homogenous pattern or are made of similar materials. Whatever the physical arrangement, the building(s) remain the central element of the photo's message.

Fig. 57: Multiple buildings as part of a harmonious overall composition

Fig. 58: In this example, the building and the secondary subject create balanced tension

One of the major aspects of more artistic architectural photography is the inclusion of elements of the surroundings as part of the overall composition. This results in a redistribution of the significance of the individual elements in an image while the inclusion of trees, people, street signs, etc. increases visual tension. Here, the building is no longer the sole subject and shares its significance with other subjects of equal value (fig. 58).

Images in which the architecture plays only a secondary role can nevertheless be considered as architectural photos. For example, if a building serves as a background for a subject or is visible as a reflection (fig. 59). It is even possible to capture architectural images in which a building, through clever use of composition and camera angles, is not actually recognizable as such. The result is a graphic image constructed purely from lines and shapes (fig. 60).

It is therefore necessary to consider just how you want to portray a building before you begin to take pictures.

Fig. 59: Architecture as a secondary subject

Fig. 60: An abstract architectural image

Fig. 61: A photo of a modern office building, with the structure itself as the dominant element

Fig. 62: Including the surroundings enhances the mood in this photo of a dilapidated building

3.2.1 What Types of Architecture Make Suitable Subjects?

Generally speaking, any building in any state of repair can make a good photographic subject. A successful architectural photo doesn't necessarily depend on the condition of the building; rather, the way a building is photographed determines whether the resulting image is pleasing. The best approach to shooting varies from building to building. A centralized, sunlit composition with the building as the dominant theme is often the best way to photograph modern office buildings (fig. 61), while the mood in a photo of an old building can be positively influenced by including some of its surroundings in the composition (fig. 62) or by dramatic weather conditions.

Another important exercise is to consider the different ways architecture is present in everyday life. These range from ancient landmarks such as churches, castles, and palaces to purely functional new buildings such as industrial production plants or warehouses. Spectacular public buildings are no more or less part of the architectural infrastructure than a small family home. Bridges, temporary construction sites, pyramids, bunkers, water towers, radio masts, and public restrooms are all part of the architectural whole that surrounds us (fig. 63). If a photographer is sufficiently creative, all of these and more can become the subjects of excellent architectural photos.

Fig. 63: An architectural photo of a bridge

3.2.2 Learning to See

Every photographer needs to have an innate feeling for particular situations and configurations of events in order to successfully identify interesting and unusual opportunities while out and about. The static nature of buildings makes it especially important to understand the spatial relations between various elements of a building. Ideally, you will be able to judge in advance which viewpoint will produce the best results, as this is one aspect of a photo that you definitely cannot alter later. If the overall composition of an image isn't right during the shoot, even heavy image processing won't help you to transform it into something better. The ability to "see" photographic subjects varies enormously from person to person. Some photographers instinctively find unusual images and new ways to portray apparently everyday subjects. They already have ideas about how to compose an image before others have even recognized the subject. But less instinctively-driven people are not necessarily destined to be bad photographers, and can find comfort in Ansel Adams' famous

saying, “Twelve significant photographs in any one year is a good crop.” And remember, it is certainly possible to learn and practice seeing opportunities.

Fig. 64: Comparing various shots of a single subject

So how should you set about training your photographic eye? One useful approach is to visit an area with a variety of architectural subjects on a number of occasions, and don’t be afraid to use up all of your available memory capacity if you are shooting digitally (fig. 64). If you sift though your images regularly, you will quickly learn to recognize which are worth keeping and which you can delete immediately. Sorting and judging your images helps you to learn what you can do differently next time. Revisiting a particular place also helps you to learn its strengths and weaknesses, and gives you the wherewithal to find new views and perspectives. This way, you are constantly honing your photographic skills and improving the quality of your images.

Another way to sharpen your eye is to shoot a couple of overview shots of a subject and analyze them later. In this case, considering which parts of a subject would make an interesting photo if they were to be isolated or enhanced (fig. 65) gives you a better eye for the potential subjects within a broadly-composed image. You can also use image processing software to perform experimental crops and to try out different ways of framing the same subject. Once you have been through processes like these, it will be much easier to find new views of the subject next time you are there in person (fig. 66).

Fig. 65: Various approaches to a composition

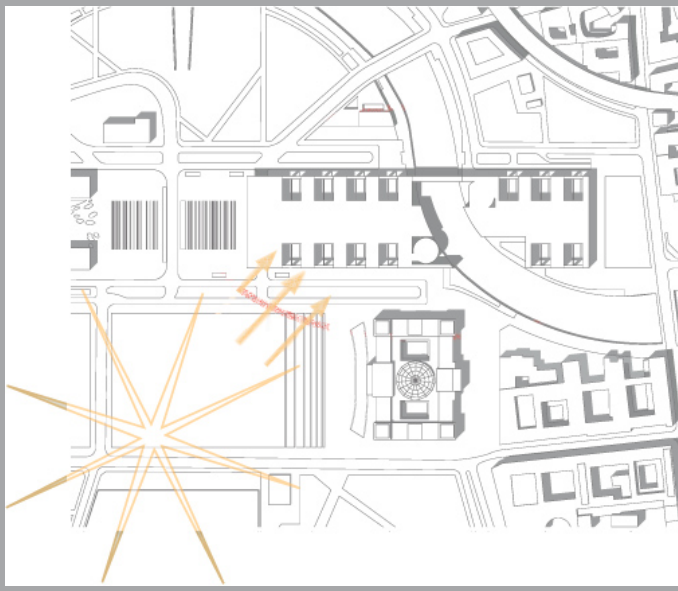
Yet another way to come to grips with the genre is to analyze coffee-table books of architectural photos. Ask yourself what is special about how the photographer has portrayed a building, or how the image is composed. Consider why the angle of view chosen by the artist works and why you like the images that please you most. And, most importantly, ask yourself what you would do differently. Studying high-quality, professionally-produced images is a great way to gain new insights that you can add to your own repertoire the next time you are on a shoot.

Fig. 66: The results of realizing some of the ideas shown opposite

Photographing Buildings: A Brief Guide

Once you have chosen your subject, you need to analyze the situation and its specific characteristics:

- *Which side of the building is best suited to being photographed? Where are shadows or backlight positioned? What is the weather like? What other structures characterize the surroundings?*
- *What specific physical structures does the building have? Are there any interesting (or irritating) reflections?*
- *How do you want to portray the building—in a documentary or an artistic style? Static or dynamic?*



The next step involves a detailed analysis of your subject's surroundings:

- *Which camera angle best emphasizes the building's strengths?*
- *Which camera positions will deliver great shots and which are less suitable?*
- *Which elements of the building's surroundings should you include in your shot, and which should you leave out?*
- *Do you want to shoot in landscape or portrait format?*

The final step involves selecting your camera settings and the accessories you will use to make the shot:

- *Which accessories (tripod, filter, remote release, etc.) do you need?*
- *Which focal length lens is best for capturing your chosen*

composition?

- *How do you want to compose your image? With the subject in the center? Using the Golden Ratio? Or with the subject positioned toward the edge of the frame?*
- *How will you avoid converging verticals?*
- *Which camera settings will produce a balanced exposure?*
- *What is the right moment to release the shutter? Which people, cars, or shadows are you waiting for?*

Fig. 67: Comparing perspective in two photos taken from the same place using two different focal lengths [17mm and 32mm]

3.3 Perspective

Taking photographs means capturing a three-dimensional space in two dimensions. The most important physical principle governing

this transformation is the principle of perspective, which represents the effect of a subject's space and depth in a two-dimensional plane. Perspective is fundamentally the projection of space onto a flat surface. Photographic images follow the rules of central projection, also called vanishing point projection, preserving the natural perception to which the human eye is accustomed.

The perspective effect in a photo is determined by the position it is taken from and the direction the camera is pointing. In other words, you can only change the perspective within an image by changing your standpoint. The widely held belief that the focal length of the lens you use influences the perspective in the resulting image is, quite simply, false (fig. 67). The spatial effects produced by wide-angle lenses are due to the fact that they capture a wider angle of view. The actual spatial relations within a scene don't change just because you alter the focal length of the lens you use to capture it.

3.3.1 The Importance of Vanishing Points

Vanishing points play an important role in the portrayal of architectural (i.e., geometrical) forms. If parallel lines in three-dimensional space extend into the distance, a photographic image will represent them as intersecting on a defined vanishing point (Vp). If you point your camera directly at the horizon, all the vertical lines within the frame will appear vertical in your image. This is an effect that we often utilize when photographing buildings.

The number of vanishing points in an image has a significant effect on its appearance. In the case of **central perspective** (not to be confused with central projection), all parallel lines going into the distance end up at a vanishing point located in the middle of the picture and at the horizon. You need to stand directly in front of your subject and position your camera horizontally (and pointing at the horizon) to take pictures like this. This means that the front wall of the building you are photographing remains parallel to the image sensor plane, which keeps all the parallel lines within the building's façade parallel in your image (fig. 68). Although this type of shot looks pleasing, it is also rather unspectacular. For some subjects it is also too two-dimensional and flat because the building's heft can hardly be seen.

Two-point perspective, which furnishes an image with two separate vanishing points on the horizon, is equivalent to photographing a building from a corner rather than head-on (fig. 69). Here too, the camera has to be positioned horizontally, but in this case, only vertical lines appear parallel in the resulting image. Two-point perspective images have a vivid, dynamic appearance that clearly illustrates the volume of a building but which can also distract the viewer from the finer points of the architecture itself.

Fig. 68: A building photographed using central perspective

Fig. 69: A building photographed using two-point perspective

Images shot from a **worm's-eye view** (i.e., from below; fig. 70) or from a **bird's-eye view** (i.e., from above; fig. 71) usually have three vanishing points. Here, the camera is no longer pointed at the horizon but instead at an imaginary point above or below it. These types of perspective come into play when conventional camera positions no longer allow you to capture the entire subject without tilting your camera. In this type of image, vertical lines also converge at a point above or below the horizon.

Fig. 70: Worm's-eye view

Fig. 71: Bird's-eye view

Fig. 72: The source photo with slightly converging verticals

Fig. 73: The same shot corrected using a tilt/shift lens

3.4 Converging Verticals

Converging verticals don't bother us when we are walking along a street, due to the close cooperation between our sense of balance and our visual perception. However, things look different when we view converging verticals in two-dimensional images, as our brain immediately signals that something is wrong. If converging verticals approach each other at a mild angle, a picture can create a restless impression, and a depicted building's aesthetics may be compromised (figs. 72 and 73). This can confuse the viewer and produce a jarring impression of a building that is sometimes severe enough to make it look as if it is tipping over backwards (fig. 74). An unwritten rule dictates that architectural photographers

generally try to keep vertical lines vertical in their images.

Fig. 74: A photo showing distinct converging verticals [focal length: 14mm]

Fig. 75: Converging verticals used deliberately as a dominant stylistic device [focal length: 28mm]

This helps to avoid unwanted tension and keeps the composition (and the appearance of the architecture) clear and uncluttered.

But are converging lines always a bad thing? Strongly

converging verticals can be used deliberately to add drama or artistic impact to an image—an effect that is often used in photos of skyscrapers or in situations where the photographer is located very close to the building and is shooting almost directly upward (fig. 75).

3.4.1 How to Avoid Converging Verticals in Your Photos

To represent a building without converging verticals is not always easy. The closer one is to the building, the more difficult it is to avoid converging verticals. This is because the camera has to be tilted up in order to fill the frame. The following sections detail a selection of techniques for working around the problem.

Fig. 76: Avoiding converging verticals by shooting from a great distance [focal length: 70mm]

Increase the subject distance: If the situation allows, simply move back and use a longer lens to reframe the subject (fig. 76). This simple measure can help to partially or even completely eliminate converging verticals if you are careful to point the optical axis of your lens directly at the horizon. You can fine-tune any remaining anomalies later on a computer. Unfortunately, there is often not enough space near a building to get far enough away. The greater the distance between camera

and subject, the greater the risk of other objects getting in the way and spoiling your composition. Increasing the subject distance also compresses perspective (see section 3.5.5).

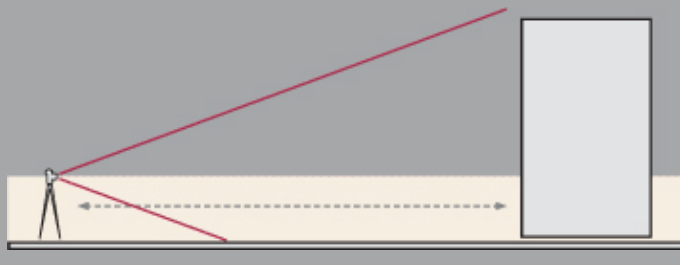


Fig. 77: Avoiding converging verticals by shooting from a raised standpoint [focal length: 20mm]

Use a raised camera position: A camera position halfway up the subject stops vertical lines from converging (fig. 77) and "automatically" frames the subject around the horizon. You will, of course, need access to a bridge, a pedestal, or the upper floors of a building in the vicinity to make use of this technique.

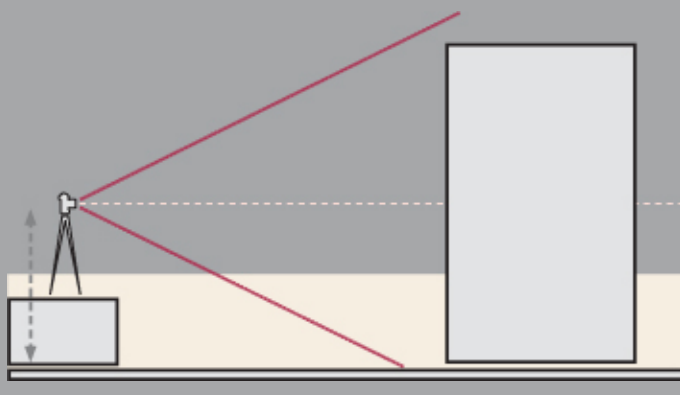


Fig. 78: Avoiding converging verticals by shooting in portrait format using a wide-angle lens and cropping the results [focal length: 17mm]

Use a short lens and shoot in portrait format: If you have to shoot from extremely close, it can help to use a wider-angle lens than would otherwise be required to make your shot. Simply set up your camera in portrait format parallel to the ground. The resulting photo will not contain any converging verticals, but the subject will appear at the top of the frame and large portions of the ground in front of the building will be visible in the lower part of the image. This imbalance is easily corrected by cropping the image later (fig. 78), but produces a smaller finished image with a non-standard format.

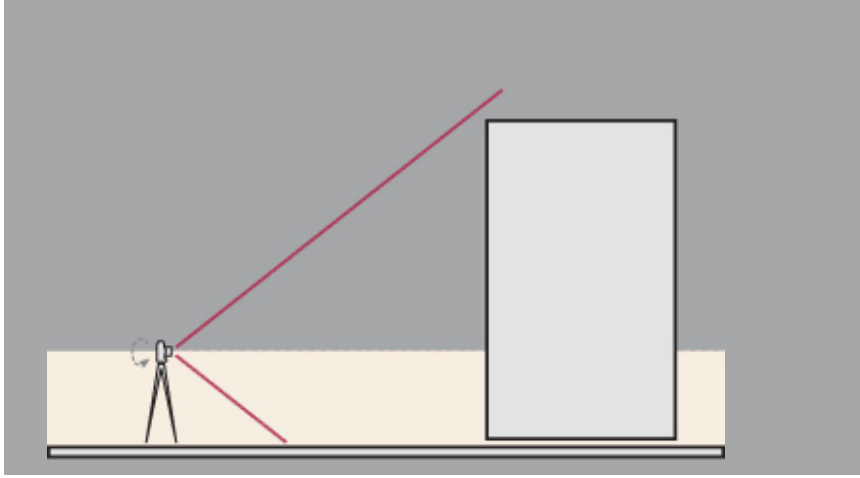


Fig. 79: Software-based perspective and converging vertical correction [focal length: 32mm]

Digital perspective correction: You can also use image processing tools on a computer to correct converging verticals. This involves distorting your image to form a trapezoid and then stretching the entire image upward to counteract the resulting compression effect (fig. 79). This technique can cause irregular sharpness and requires the computer to create artificial image data in the upper portion of your image. As a consequence, it quickly reaches its technical limits if the lines you want to correct converge too strongly. If in doubt, it is always preferable

to use this method in combination with one or both of the other methods described above to keep converging verticals to a minimum while shooting.

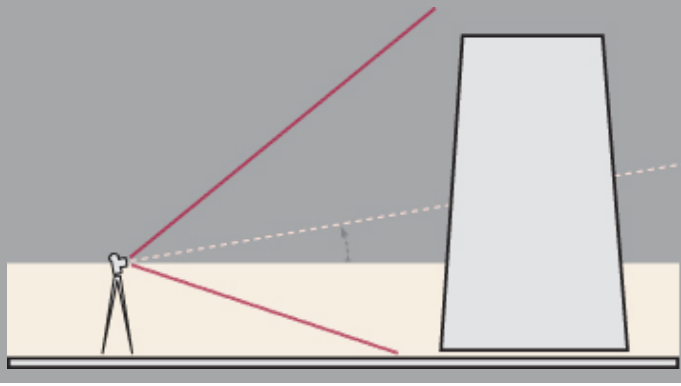
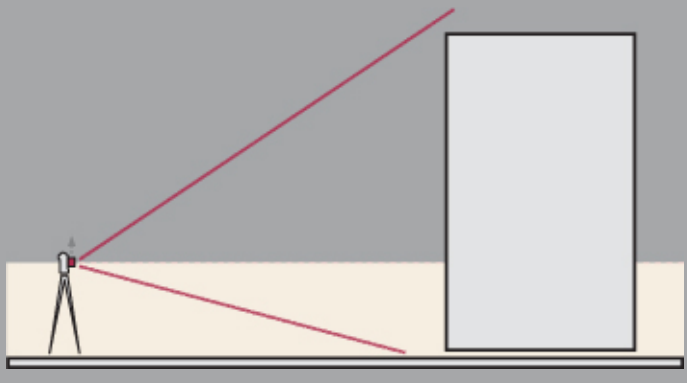


Fig. 80: Perspective correction performed using a tilt/shift lens [focal length: 35mm]

Use a tilt/shift lens: This is the best, but also the most expensive way to produce original images without converging verticals. Use of a tilt/shift lens will allow you to capture vertical lines correctly, even from a relatively low camera position (fig. 80), and will keep the required post-processing (and consequent

image quality loss) to a minimum. The technique also allows you to shoot directly using your desired framing, rather than having to crop your image later.



3.4.2 How Do Tilt/Shift Lenses Work?

Tilt/shift lenses allow you to shift the optical axis of the lens in relation to the film/sensor plane (fig. 81). Theoretically, this would cause extreme vignetting in a standard lens, but the enlarged image circle in a tilt/shift lens makes it possible to shift the optical axis by up to 12mm without adverse effect. The special construction of these lenses means that they have no autofocus functionality and, if you are using them with an adapter, no automatic aperture control. These are, however, only minor disadvantages.

Their larger image circle makes it possible to use medium format lenses as tilt/shift lenses with conventional 35mm SLRs by way of a special shift adapter (fig. 82). Medium format lenses also have longer flange focal distances than conventional SLR lenses, giving this type of camera/lens combination sufficient space to insert an adapter. However, vignetting caused by the camera's mirror box limits the shifts you can perform as well, and therefore the amount of convergence you can correct using an adapted lens.

So how is a tilt/shift lens actually used? First, use a spirit level or a tripod with a built-in level to position your camera horizontally. It is useful to line up recognizable features of the building at eye level with the AF area markers in the center of the viewfinder, and then set focus with your lens in a neutral shift position, ideally using live view and your camera's monitor

magnifier function. You should also meter exposure now, as your camera's focus system will no longer deliver accurate results once you have shifted the optical axis of the lens.

Fig. 81: Using a tilt/shift lens to alter the vertical position of the optical axis helps to physically correct perspective errors

Fig. 82: Using a medium format lens and a shift adapter to shift the optical axis and correct perspective

Fig. 83: Using a tilt/shift lens to shift the optical axis within the image circle

Alternatively, you can meter exposure more precisely in live view mode with the lens shifted and the camera's mirror raised. You can now shift the optical axis upward, which moves the horizon down and makes parts of the subject that were previously outside the upper edge of the frame visible in the view-finder (fig. 83). The camera and lens remain in a horizontal position. This technique produces an image with no converging verticals and can be performed in exactly the same way in the opposite direction (i.e., moving the optical axis downward in order to photograph lower portions of a building; fig. 84). Shift lenses also allow you to shift the optical axis sideways, which can be useful if you want to photograph a building using central perspective from a non-central viewpoint (figs. 85 and 86) or if you want to avoid being reflected in the building's façade.

Fig. 84: This photo was shot with the optical axis shifted downward [focal length: 55mm]

Shifting the optical axis also allows you to alter your composition—for example, to remove an irritating foreground and include more sky in the frame (figs. 87 and 88). In addition, tilt/shift lenses can be used to aid shooting panorama images (see section 3.6.3).

Using shift lenses always produces a certain amount of vignetting and corner blur at the extreme ends of the shift range, so avoid using the maximum shift settings if you can. If your lens doesn't provide sufficient shift, you can also tilt the camera slightly

to increase the shift effect, which keeps digital corrections—with their inherent loss of image quality—to a minimum.

The tilt function in a tilt/shift lens allows you to alter the plane of focus of the lens according to the Scheimpflug principle. The uses for this capability in architectural photography are limited but can, for example, be used to keep an entire façade in focus if you are shooting downward from a close distance. Tilt functionality can also be used to create a miniature model effect in photos of real-life scenes (see section 3.13.7). If you are using just the shift function, make sure that the tilt function is locked in its zero position. Otherwise, you may end up unwittingly shooting images with extensive unfocused areas.

Fig. 85: An object in the center of the foreground (the car) spoils the overall composition [focal length: 24mm]

Fig. 86: Moving the camera slightly to the left changes the perspective (check out the red circles) and makes the desired shot possible [focal length: 24mm]

Fig. 87, 88: Different effects produced using differing shift settings

[focal length: 24mm]

3.5 Camera Standpoint

Since camera position and direction alone are the factors that influence perspective in a photo, making a careful choice of standpoint is essential to the success of a shot. Even slight changes in standpoint can have a strong influence on the look of a photographed building.

3.5.1 The Ideal Subject Distance

The ideal distance between camera and subject depends largely on the type and size of the building, the nature of its immediate environment, and the photographer's visual concept for the image.

If the three-dimensional depth of the building is important to the final image, select a standpoint that is close by. The farther you are from a building, the flatter it will appear in a photo (see section 3.5.5). If the building's environment is cluttered, you will have to move closer to get a clear view, but in order to produce an undistorted, realistic-looking image, the laws of optics dictate that you need to move farther away. The larger a building, the farther away you will have to be to capture it with natural-looking proportions.

Extreme standpoints—i.e., those that are unusually close or very distant from the subject—provide specific challenges of their own. Shooting from close up produces pronounced perspective effects, and the low viewpoint emphasizes the effects of protruding or sunken elements of a façade, especially in the upper floors (fig. 89). If you shoot from too near, the resulting converging verticals cannot be corrected later. If the situation forces you to shoot from close up, you will simply have to incorporate the altered perspective in your composition. Extreme perspective in photos of skyscrapers can produce additional tension that contributes to the dynamism of the image, even if the building looks less realistic as a result (fig. 90). The farther you are from your subject, the smaller the role converging verticals will play, and the easier it will be to correct them if they do appear. The disadvantages of greater subject distances are the risk of extraneous objects spoiling your

composition and the two-dimensional look that buildings take on when photographed from farther away (fig. 91).

A useful rule of thumb for exterior architectural photography states that the best subject distance lies somewhere between one and three times the height of the building. This is one of the reasons architectural photographers often resort to the use of wide-angle lenses in the course of their work.

Fig. 89: Here, the camera is too close to the subject, producing an unfavorable representation of the balconies [focal length: 24mm]

Fig. 90: Dramatic perspective produced by shooting from very close up [focal length: 14mm]

Fig. 91: In this example, a greater subject distance compresses the perspective and produces virtually no converging verticals [focal length: 150mm]

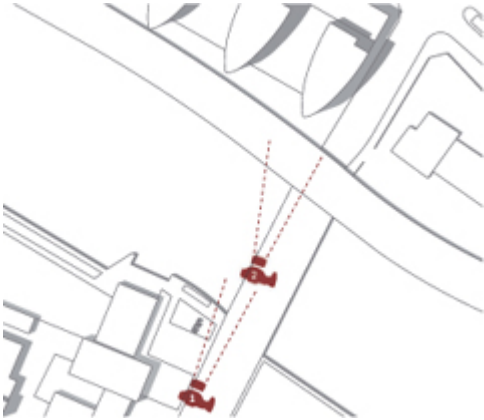


Fig. 92: Photographed from afar, the building appears rounded and attractive [focal length: 200mm]

Fig. 93: Photographed from close up, the building appears narrower and more pointed [focal length: 100mm]

3.5.2 The Effects of Viewpoint on Perspective

Different viewpoints can provide you with very different compositions, even if you are photographing a single building. Usually, you can compensate for the changes in framing that changes in distance produce by using a different focal length lens. Experienced photographers can use subtle changes in composition to emphasize particular aspects of a building and its design (figs. 92 and 93), or to conceal its less attractive characteristics. A carefully considered standpoint also helps to clarify the relationships between different elements of a design or to give emphasis to various parts of the structure (figs. 94, 95, 96).

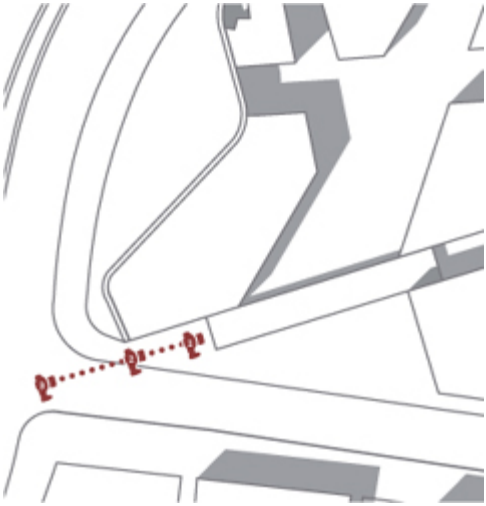
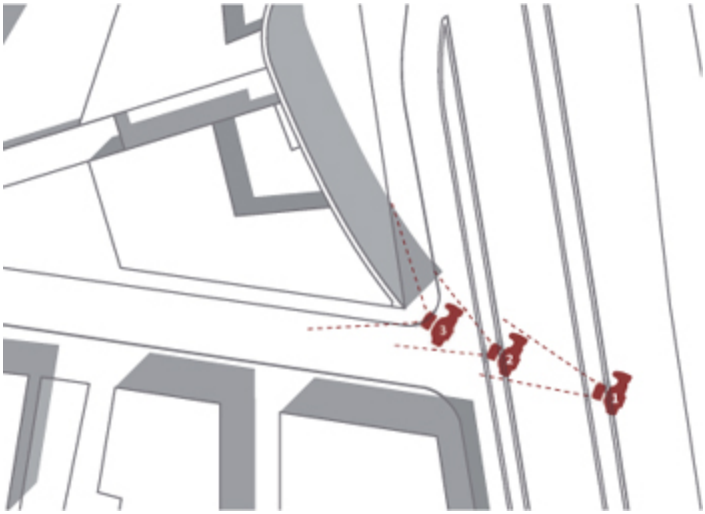


Fig. 94, 95, 96: The different proportions and moods that a change of standpoint can produce [focal lengths: 17mm, 35mm, 50mm]



A single building can appear calm and clear from one angle or dramatically proportioned from another (fig. 97). A façade can be made to appear transparent and welcoming from one point of view or shuttered and secretive from another (figs. 98 and 99). Sometimes, moving the camera just a few meters can produce a completely different effect.

Using techniques like these, a photographer can exercise considerable influence on the effect of a photo without that influence being obvious to the viewer. Before you start a shoot, it is important to have a clear idea of just how important your choice of standpoint is and how this choice can affect your original concept and the results. If you shoot from the wrong place, no amount of image processing will improve the results.

Fig. 97: On the left, a medium subject distance produces a natural-

looking image with a realistic feeling of depth. In the center and on the right, increasing proximity to the subject produces increasingly dramatic spatial effects [focal lengths: 50mm, 24mm, 12mm].

Fig. 98: Here, the camera angle compresses the space between the individual elements of the building's framework and gives the glass façade a forbidding, closed look

Fig. 99: A slight change of standpoint completely alters the effect of the façade, making it welcoming and transparent

3.5.3 Standpoint and Surroundings

A change in standpoint also means that other elements of the immediate environment will be captured and portrayed differently, which can have positive or negative effects on the overall look of an image. It is easier to concentrate on photographing a freestanding building than one which is located close to other buildings in a busy environment. A theoretically interesting viewpoint is not of much practical use if the view of the building itself is obscured by trees or bushes. In cases like this, a small change of camera position can make all the difference (figs. 100 and 101). A change of standpoint can also give us a different view of a building's surroundings, producing an image with a completely different mood (figs. 102 and 103). Last but not least, moving the camera can alter the weighting of a building and its surroundings, thus conveying a very different message (figs. 104 and 105). The art of successful architectural photography lies not only in finding the right view of a building, but also in the skillful integration of its surroundings in the overall composition.

Fig. 100: The cluttered foreground spoils this composition ...

Fig. 101: ... but a slight change of camera position produces a successful image

Fig. 102: In this image, the street dominates the composition and visually separates the viewer from the building. The forecourt plays only a secondary role [focal length: 24mm].

Fig. 103: Once again, changing the camera position completely alters the impact of the scene. The forecourt appears larger and wider, and gives the viewer a feeling of inclusion in the building [focal length: 24mm].

Fig. 104: In this image, the building and the courtyard dominate the composition, with the sculpture playing an ancillary role [focal length: 24mm]

Fig. 105: Changing the camera position gives the sculpture the dominant role in this photograph of the same subject [focal length: 24mm]

Fig. 106: The camera's position on the diagonal axis of the building gives the resulting image a monumental look

Fig. 107: A strictly symmetrical composition

3.5.4 Standpoint and Symmetry

Symmetry, too, can be used to great effect in architectural photos, but it is important to differentiate between architectural and photographic symmetry. A symmetrical building doesn't have to appear symmetrical in a photo, although a coincidence of structural and visual symmetry can create impressive effects. Most viewers find symmetrical architectural images pleasing, due to their monumental and often slightly artificial look (fig. 106).

In order to use symmetry successfully as an element of a photographic composition, the photographer has to align the

camera precisely along the axis of symmetry of the building. Even the smallest movement away from this axis can create unnecessary tension and spoil the effect. Ideally, objects external to the building itself will either adhere to the basic symmetry in the image (fig. 107) or not be of sufficient significance to spoil the overall effect. Photos shot along the diagonal axis of square buildings create especially interesting visual dynamics, as they produce a great feeling of depth in addition to the symmetry the image is based on. Photos of courtyards and round or elliptical buildings are perfect subjects for close-range, symmetrical architectural photos, too.

Fig. 108: An unimpressive, flat symmetry effect caused by the head-on viewpoint

The strength of a symmetrical effect depends on the degree to which the physical depth of the building is made visible. If you photograph the side of a building head-on, the effect will be less dynamic, and the special effect that symmetrical vanishing points have will be lost (fig. 108).

3.5.5 Spatial Depth

The feeling of depth in an architectural photo is related directly to your chosen standpoint. If there are several objects located far away from the camera, the space between them seems compressed. On the flip side, if the distance between the subject and the camera is very short, the foreground appears more prominent than the

background. Close objects will appear very large, and objects farther away will appear much smaller, giving the image a feeling of openness and space.

Practically speaking, you will need to use a telephoto lens to properly frame distant subjects and wide-angle lenses to capture subjects that are close by. Perhaps this gives rise to the myth that the perspective depth perception is a function of focal length. In fact, it can be just as simple to use a wide-angle lens to capture distant subjects and crop the results to achieve your desired framing. The flip side of the same idea is to use a telephoto lens at a short distance and shoot a sequence of images that you can later merge into a panorama—the perspective and perception of depth (not to be confused with depth of field) in both images would remain the same.

Fig. 109: Here, the large subject distance strongly compresses perspective [focal length: 180mm]

Fig. 110: The camera position and the moderate focal length produce a realistic-looking spatial effect [focal length: 40mm]

Fig. 111: In this case, an ultra-wide-angle lens and a shooting position very close to the subject give the building and its surroundings an unnaturally wide open look [focal length: 17mm]

Extreme distances give subjects a two-dimensional look reminiscent of collage-type effects, with the rear elements of a building appearing only slightly smaller than the front elements. The apparent compression of space gives a building a flat, almost cardboard look. This type of effect can be used to produce abstract-looking images that heavily disguise the real nature of a subject's depth (fig. 109).

Documentary photographers usually try to keep the depth effects in their images as realistic-looking as possible, and tend to use moderate wide-angle lenses to achieve this. Full-frame focal lengths of around 40mm produce images with a feeling of depth that is very similar to that of human visual perception, and the viewer of such an image can accurately judge the spatial relations of objects within the frame on the basis of real-world experience (fig. 110). If you shoot closer to the same subject using a shorter focal length lens, you can give otherwise cramped-looking architecture a slightly artificial, wide open look (fig. 111). Objects close to the camera appear disproportionately large, while distant objects appear smaller than they really are. Overall, photos shot at close distances using short focal lengths produce a greater feeling of depth that communicates either spatial depth (fig. 111) or extreme perspective distortion (fig. 112). Photos shot from afar give the viewer very little spatial information, whereas wide-angle shots provide a feeling of depth that is often exaggerated, but nevertheless interpretable.

Fig. 112: Here, the short subject distance produces strong perspective distortion [focal length: 17mm]

Fig. 113: Using a telephoto lens emphasizes details in a building's surface against a monotone background [focal length: 100mm]

3.6 The Effects of Focal Length

The choice of focal length is closely related to the camera standpoint, although there are various possible approaches to finding the right combination of the two factors. Some photographers stick to a predetermined camera position and select

an appropriate focal length, while others prefer to use a particular lens and move about until they find the viewpoint and composition that best matches it.

Using a zoom lens is a more flexible approach, as it allows you to adjust focal length steplessly without having to move the camera. If you use a fixed focal length lens, you will have to move around a bit more to find the right position.

Extreme focal lengths (less than 16mm or greater than 200mm equivalent) produce extreme effects that are seldom useful in an architectural context, but do allow you to capture images that would otherwise be difficult or impossible to realize. Ideally, every architectural photographer should have access to a broad range of lenses that allow an unrestricted choice of camera position.

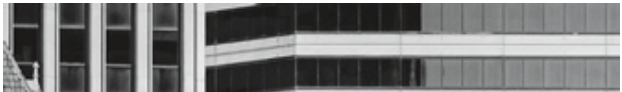
3.6.1 Long Focal Length Lenses

As already mentioned, the fact that they compel the photographer to shoot from a large distance restricts the use of long telephoto lenses to special situations.

Long focal length lenses are great for emphasizing details and the materials used in a building's structure (see section 3.8.3), but give you significantly less depth of field to work with than wide-angle lenses. It is therefore important to use relatively small apertures when using long lenses; otherwise you run the risk of blurring important details.

The narrow angle of view of a telephoto gives you the opportunity to emphasize details by isolating them from the background (fig. 113).

Due to the compressed perspective produced by the large distance from the subject, telephoto lenses also allow you to portray multiple subjects that inhabit large spaces in a single image (fig. 114), giving them a mutual context that is otherwise not obvious to the viewer (fig. 115). The same effect can also be used to isolate shapes and produce artistic images of a much more abstract nature (fig. 116).



HOBA

Fig. 114: A long lens and a large subject distance produce strongly compressed perspective [focal length: 150mm]

Fig. 115: In this image, a long lens was used to establish a relationship between two buildings that are actually located a great distance apart [focal length: 100mm]

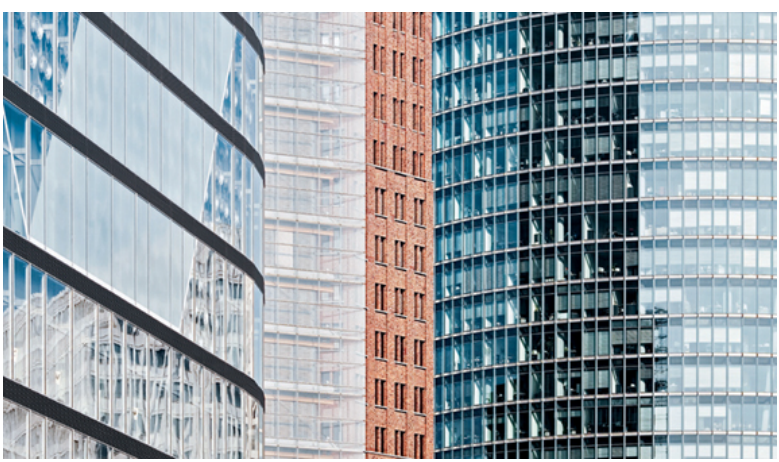


Fig. 116: Here, tight framing and a long lens produce an image dominated almost completely by abstract shapes [focal length: 120mm]

3.6.2 Short Focal Length Lenses

Medium wide-angle lenses with equivalent focal lengths of between

24 and 35mm are perfect for producing realistic-looking images of buildings and are firm favorites among architectural photographers.

Ultra-wide-angle lenses are often used if the circumstances force the photographer to shoot from very close to (or inside) a building (fig. 117), and make it possible to capture photos that would otherwise be impossible to shoot. But take care: Ultra-wide-angle lenses and short subject distances almost always produce strong perspective distortion and an overemphasized feeling of three-dimensional space. Such effects definitely belong to the more artistic side of architectural photography and can be used to produce dynamic, but not necessarily realistic architectural photos (fig. 118).

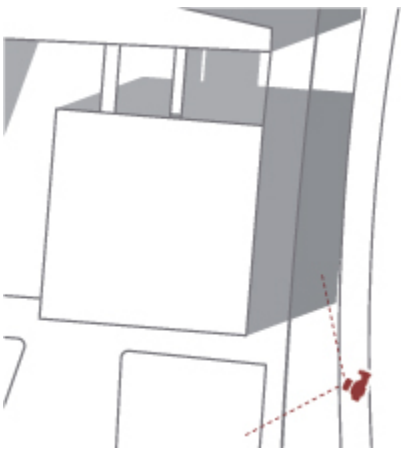


Fig. 117: An ultra-wide-angle shot made necessary by the close proximity of the neighboring buildings [focal length: 14mm]

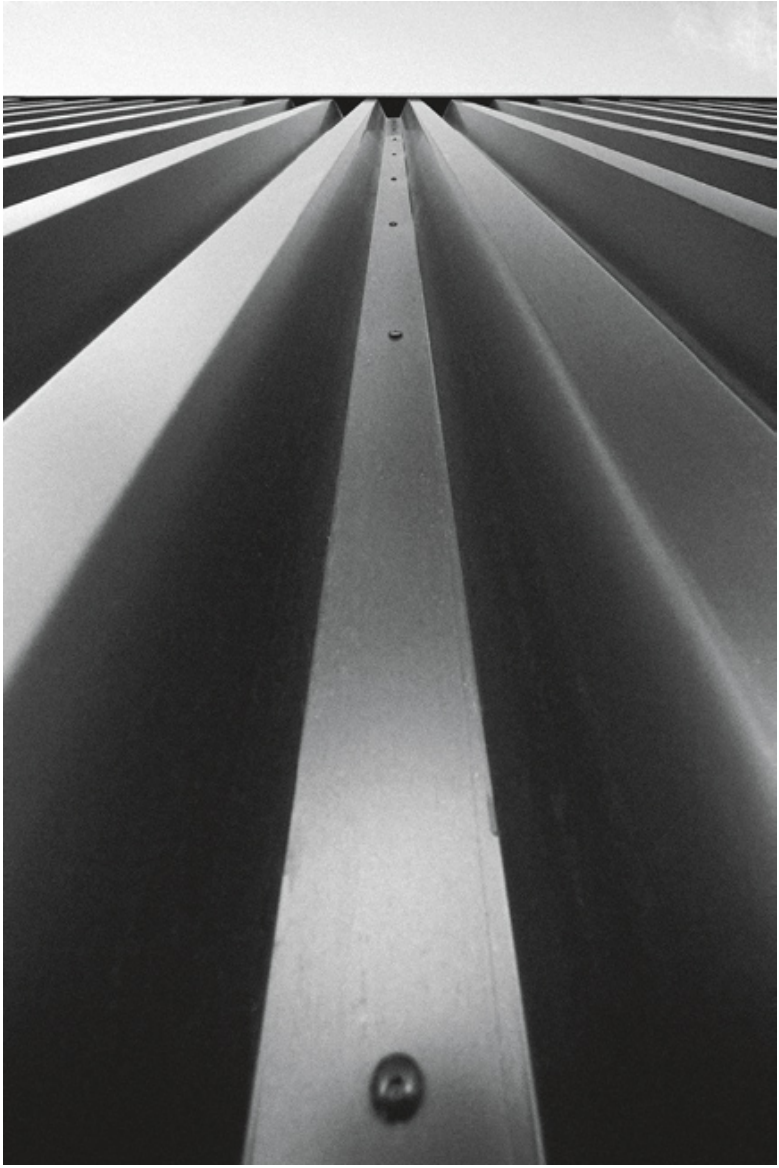


Fig. 118: The combination of an ultra-wide-angle lens and an unusual camera position produces an extremely dynamic overall effect [focal length: 17mm]

If you are using a wide-angle lens for the first time, you will quickly find that even the smallest movements of the camera away from the horizontal axis produce strongly converging verticals (fig.

119). It is therefore extremely important to ensure that your camera is aligned correctly if you want to prevent this from happening. Additionally, wide-angle zoom lenses tend to produce pronounced barrel distortion. Correcting these types of effects requires additional cropping during image processing, so make sure you leave sufficient space around your main subject while shooting (see section 4.3.1).

Fisheye lenses, with their ultra-short focal lengths and extremely wide angles of view, are rarely used in an architectural context due to the extreme distortion they produce (fig. 120). Fisheye effects are often fascinating at first glance and are great fun to experiment with, but can become quite irritating if they are overused.

Fig. 119: Rotating the camera slightly downward while using a wide-angle lens produces obvious converging verticals [focal length: 14mm]

Fig. 120: Fisheye lenses produce extremely distorted views of architectural subjects [15mm full-frame fisheye lens]

3.6.3 Increasing the Angle of View Using Planar and Shift Panorama Techniques

If the focal length of your lens is not short enough to capture the entire subject, you can always shoot a sequence of partial images and merge them together digitally later on (fig. 121; see also section 4.4.1). In order to produce realistic-looking results, it is usually best to stitch your images together to form a flat, or planar, panorama instead of a cylindrical panorama. The latter often have extreme formats and obvious distortion of straight lines outside of the image center. The usable angle of view of a planar panorama is less than 180 degrees.

If you are shooting a panorama handheld, try to rotate your camera around its nodal point (see section 3.7.1) rather than around your body's own central axis. This will give you maximum flexibility and a minimum of difficulty when aligning and merging your images later, especially if you are photographing your subject from close up.

Panorama techniques not only help to increase the realizable angle of view but also can be used to increase image resolution severalfold, which is of particular interest to photographers who

want to produce large-scale prints of their work.

A more precise way to increase the angle of view in your photos is to use a shift lens. Simply shoot two (to four) source images using opposite or rotated directions of shift and stitch them together on a computer (fig. 122; see also section 4.4.2). It is extremely important to leave sufficient overlap at the edges of panorama source images. Common sets of panorama source images include two landscape format images merged to produce a 5:2 wide-screen panorama or three portrait format images merged to make an approximately 5:3 panorama. It is also possible to shoot four source images with the lens rotated through 30 degrees up or down. The shooting sequence would then be as follows: top left, bottom right, rotate through 60 degrees, top right, bottom left. The resulting image will have an aspect ration of about 3:2. The advantage of this technique is that, unlike when you rotate the camera, the alignment of the camera itself doesn't change, making it easier to merge the resulting images. However, the objects in the image should be as distant as possible, because even the minimal shift of the lens axis has a negative effect on the appearance of objects close to the lens. The consequence is a slight shift of the image elements, which of course complicates the stitching process.

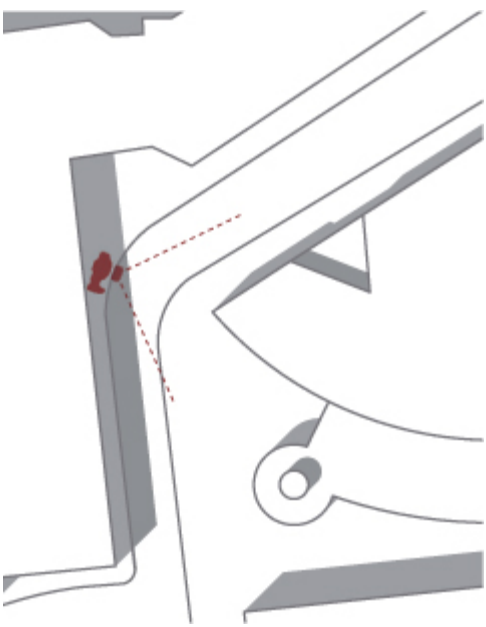


Fig. 121: A planar panorama constructed from three portrait format source images [focal length: 17mm]

Fig. 122: A photo constructed from two source images shot using different shift settings [focal length: 2 x 24mm]

Using a shift lens or shift adapter with an integrated or attached tripod socket makes it possible to shift the camera position while keeping the lens static. This way, you can be sure to produce source images with precise overlaps (fig. 123). If your tripod head has a movable quick-release plate, you can achieve the same effect by moving the camera in the opposite direction to the shift that you apply to the lens.

Use the manual exposure mode to ensure that your exposure settings remain constant when shooting both types of panoramas. Differences in exposure between shots cause differences in image brightness in the overlap areas that then have to be corrected manually.

Fig. 123: A camera with a shift adapter affixed to a tripod using an L-bracket, allowing the camera to be freely shifted horizontally

Fig. 124: Landscape, portrait, and square format images of a single subject

3.7 Image Formats

The image format you use can have a significant influence on the way an image is perceived. Landscape format is the most commonly used in architectural photos, as it most closely represents the way we see our surroundings. Portrait format images are used less often, while a square format (fig. 124) is calmer, and emphasizes neither the vertical nor the horizontal dimension.

The camera's image sensor or film format determines the format of the RAW image data (usually 3:2 or 4:3), although cropping allows you to change the basic dimensions of an image later. Extreme formats and framing that is not aligned with the lines within the subject immediately attract the viewer's attention and signal an unconventional image.

3.7.1 Extreme Formats and Panorama Images

A panorama is an image in which one dimension is many times longer than the other, offering the viewer an unusual view of a scene that doesn't correspond to conventional ideas of visual perception (fig. 125). This unusual view also has an effect on the way the subject is perceived. While a heavily cropped image (fig. 126) reproduces a situation in a relatively undistorted fashion, panoramas constructed from multiple source images often portray improbably large vertical or horizontal angles of view (fig. 127).

Fig. 125: The human field of view: approximately 170 degrees horizontally and 130 degrees vertically

In contrast to planar panoramas (see section 3.6.3), cylindrical panoramas can cover angles of view as large as 360 degrees and visually distort all horizontal lines that are not located on the

horizon (fig. 128). Spherical panoramas are designed for interactive presentation on computer monitors. They cover not only a 360-degree horizontal angle of view, but also 180 degrees vertically and show even more distortion than cylindrical panoramas. Printed spherical panoramas are visually more similar to fisheye photos than to ones shot using ultra-wide-angle lenses, and as such present an unrealistic view of the subject. In architectural situations, this type of panorama is not used to accurately reproduce the proportions of a building, but serve more to squeeze a complete overview of a broad scene into a single image. The major characteristics of successful panoramas are invisible seams and a composition that effectively uses the entire available space within the elongated frame.

So how do we go about creating a panorama? A tripod is an essential tool for the creation of cylindrical panoramas made up of multiple source images. Precise horizontal camera alignment makes it easier to merge the source images later and avoids converging verticals. Shooting in portrait format helps to cover the maximum possible vertical angle of view, and the best way to do this is using either a simple L-bracket (see section 2.5.2) or a custom panorama head designed for use with your specific combination of camera and lens. A high quality panorama head can be adjusted to rotate around the nodal point of one or a number of camera/lens combinations. The nodal point is the point around which you need to rotate your camera to produce precisely superimposed overlaps between the individual source images. A tripod head with a built-in spirit level and 360-degree scale is a great aid to producing precisely aligned and overlapped panorama source images. Some DSLRs have grids that can be displayed in the viewfinder or on the monitor, and these too, help to align the camera during a panorama shoot. Accessory focusing screens with etched-in grids are available for digital and analog SLR cameras. The focus area indicators in your camera's viewfinder also make a useful impromptu alignment aid. Panorama source images should preferably be shot using the same exposure values, but if the light conditions vary too much, you can also use exposure compensation values to counteract the effects. Keep in mind, that this will make it more difficult to stitch the images together manually. However, stitching software is quickly becoming increasingly powerful, and many programs offer compensation functionality that automatically balances the lighting

in a stitched image. Remember that clouds moving across the sky can shade the sun during a shoot and cause significant differences in exposure between shots. Make sure that no moving objects lie in the overlap areas between shots, as these are sure to produce anomalies that are difficult to retouch later.

Fig. 126: A single image formatted by means of heavy vertical cropping

Fig. 127: A planar panorama constructed from four source images [focal length: 4 x 24mm]

Fig. 128: A cylindrical panorama: horizontal lines not located directly on the horizon are visibly distorted

3.7.2 Image Orientation

Every rectangular image has an aspect ratio that determines whether it is viewed in landscape or portrait format. Buildings that are broader than they are high are therefore usually photographed in landscape format, while those with a dominant vertical orientation are generally portrayed in portrait format. This means that the image format is usually a function of a building's form and is intended to produce an image that portrays it without imposing any visual constraints.

However, if the photographer wishes to include additional elements of a building's surroundings in the image, this can reduce the dominance of the building itself within the composition and alter the required image format. A second major element in an image can completely change its perceived orientation (fig. 129).

If you deliberately use a format that doesn't mirror the structure of the subject, you will create an image with additional tension that can significantly alter the way the subject is perceived. The image format can be used to intentionally provide a counterpoint to the architecture itself (figs. 130 and 131). Using this type of technique, the photographer can influence the composition and emphasize relationships and contradictions within the frame. In such cases, the architecture can even take on a role that is secondary to the composition of the image itself, once again indicating an artistic approach to architectural photography.

Fig. 129: In this example, an additional compositional element (the aircraft) determines the format of the finished image

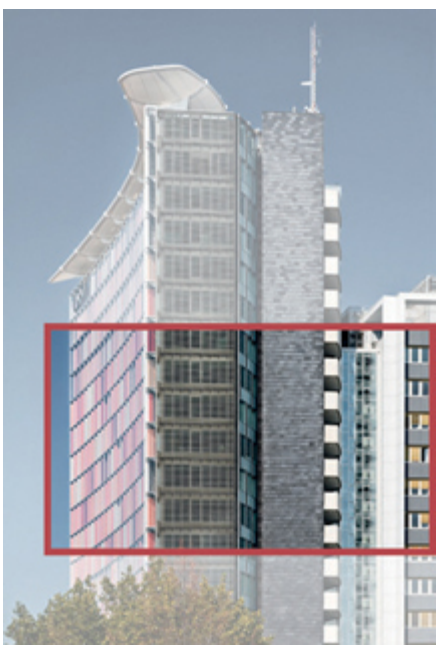


Fig. 130: Overview

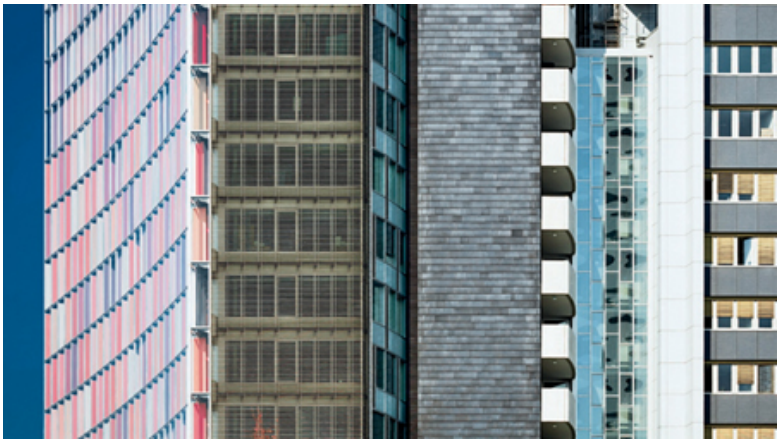


Fig. 131: The vertical nature of the building's structure is counteracted by the landscape format of the image

3.8 Composition and Framing

Every photographer should consider the composition and framing of an image before shooting. You can, of course, crop an image later, but the cornerstone of a successful image is always laid before the shutter button is pressed. It is essential to consider how the interplay between objects, shapes, lines, and spatial relations in an image can be brought together to form a suspenseful but effective whole. The aim of a great photo should be to captivate the viewer using a composition that complements the overall effect of the image. This means that an image can contain obvious visual contradictions without losing its overall effectiveness. On the other hand, a failed composition can make even the most spectacular building look dull or even unattractive.

3.8.1 Composition

There is no simple formula for composing a great photograph. Locating the subject in the center of the frame produces a balanced, but often static-looking image. This type of composition is often used by documentary architectural photographers (fig. 132). A central location is essential if you want to produce a precisely symmetrical view of a building (see section 3.5.4).

As in other genres, architectural photographers often choose non

central compositions in order to produce more interesting images. The *Golden Ratio* and the *Rule of Thirds* are two rules of thumb that are often used to aid successful image composition (see page 100) and that produce balanced but interesting images (fig. 133). But sometimes, the most impressive images are those which simply ignore the rules of photography, aesthetics, and artistic proportions (figs. 15 and 134). Extreme images like these have to be very carefully composed in order to be effective, and the difference between a sophisticated and a failed composition can be very fine. Architectural photos portray physically large subjects that take up a large proportion of the available space within the frame, and it is all too easy to spoil the visual balance in an image by putting too much emphasis on a single part of the frame.

Fig. 132: A calm, static composition enhanced by the central position of the building within the frame

Fig. 133: A dynamic, suspenseful composition that follows the golden ratio rule

Fig. 134: Here, an extremely one-sided composition provides us with a very unusual image

In a photo, a building doesn't always have to be visible in its entirety. Parts of a structure that are less relevant to the overall effect can be completely left out. Even a partially visible façade can deliver sufficient information to enable the viewer to interpret the building correctly, and a carefully chosen viewpoint can often reveal a more interesting view than a conventional full-frontal shot (fig. 135). In such cases, you can do well to remember Robert Capa's famous quote: "If your pictures aren't good enough, you're not close enough."

The importance of the use of space within a composition is often underestimated. Space is an important part of all architectural

structures, and a photographed building needs room to breathe. If an architectural photo is too tightly cropped, it will create a cramped, unfavorable impression (fig. 136). Always try to see emptiness as unconfined space and actively incorporate it into your compositions (fig. 137).

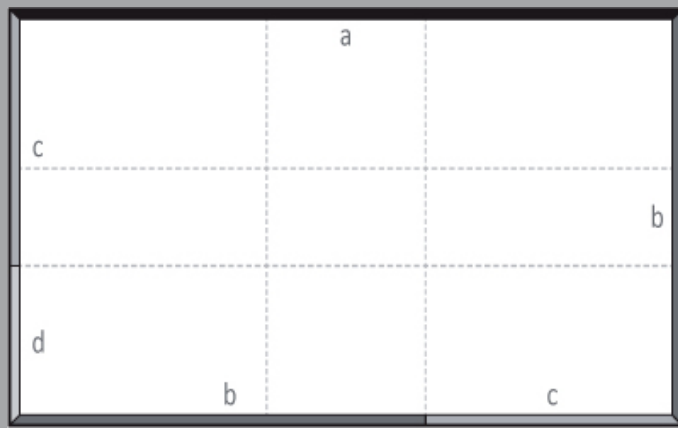
Fig. 135: A composition with partially visible façades

Fig. 136: The extreme crop gives this image a cramped feel

Fig. 137: Composing around empty space

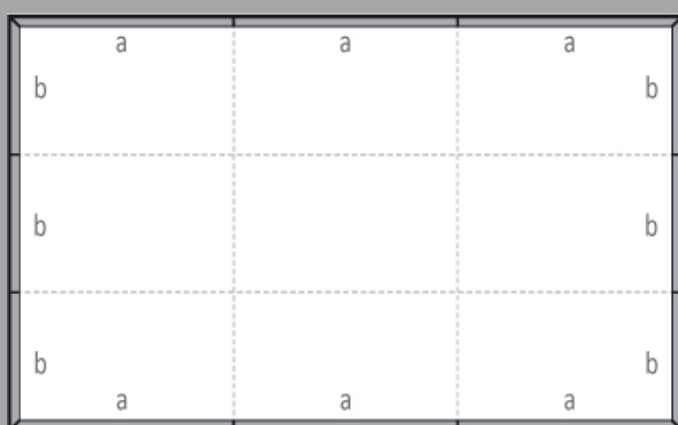
The Golden Ratio and the Rule of Thirds

The Golden Ratio is a ratio (1 : 1.618) that is widely used in the arts and architecture to symbolize ideal proportions and harmonious aesthetics. Compositions that adhere to the Golden Ratio are the basis for many successful architectural photos.



a : b = b : c = c : d = 1.618

The Rule of Thirds is a similar rule of thumb that conceptually divides the area of an image vertically and horizontally into thirds, resulting in nine equal parts. If you compose your image so that important details or features lie on the imaginary dividing lines between the segments, the result is usually pleasing and balanced.



3.8.2 Composition and a Subject's Surroundings

Architecture and its surroundings influence each other to equal degrees, so it is important to consider in advance whether you want to include a building's surroundings in a photo (fig. 138) or whether they should be excluded. The elements in question include static objects such as trees, streetlights, walls, and signs, as well as moving objects such as people, cars, and clouds. Including such

elements makes it easier for the viewer to interpret an image of a building, but can also have the opposite effect by making it appear too cluttered.

Fig. 138: Elements of the surroundings influence the overall impression made by a building

Fig. 139: A clearly structured composition with no additional elements produces a clean, clinical-looking image

Stationary Image Elements

It is important to have an idea of how you want to portray a building before you begin a shoot. If you want to create a clear, clinical look, you will need to reduce all distractions to a minimum and exclude any extraneous objects from the frame (fig. 139). This type of image has a clear message but can appear distanced. On the other hand, it is easy to positively influence the message communicated by a photo by selectively including external elements in your composition (fig. 140). Including parts of a building's surroundings in an image is by no means just a compromise necessitated by a lack of space (see section 3.5.3). For example, the purpose of an airport control tower only becomes evident when its surroundings are visible too, and a bridge only has meaning if it is photographed with the space it spans. Additional objects can also breathe life into an otherwise sterile image and provide accents that give the viewer more information about the subject's context. External objects can also serve as a yardstick for judging the size of a building (fig. 141). Artistic architectural photographers often use additional visual elements to emphasize the relationships between a building and its surroundings (fig. 142).

Fig. 140: Surrounding objects breathe life into this image

Fig. 141: Additional objects give clues regarding the scale of the subject

Fig. 142: A silhouetted Image that includes elements of the surroundings in the composition

People and Other Moving Objects

People, cars, and other moving objects only appear for a very short time in a subject's surroundings, making it relatively simple to deliberately include or exclude them from a composition (figs. 143 and 144).

The inclusion of people in architectural photos is the subject of much debate, as they can influence the dynamics of an architectural scene in both positive and negative ways. Historically, people were usually deliberately left out of architectural compositions, particularly in the genre's infancy because of the technical limitations imposed by the long shutter speeds used by the

equipment of the day. The fact that a building has no purpose without the presence of people makes this practice particularly ironic, although the presence of people in architectural images can distract the viewer from the main subject (fig. 145).

Fig. 143: People used as an additional compositional element

Fig. 144: The same composition, but with people deliberately left out

Fig. 145: in this example, people liven up the overall image, but distract the viewer's attention from the building

Contemporary architectural photographers generally leave people out of their compositions less often than their predecessors did. People are often used to add movement and vitality to a scene (see fig. 54) and can be used selectively to make context and scale easier to interpret (fig. 146). If people are to be visible in an architectural photo, they should be located close to the building to ensure that the proportions in the finished image are realistic. Human subjects that are portrayed too close to the camera appear disproportionately large and tend to distract the viewer's attention from the building itself.

The interaction between people and buildings is a characteristic of the artistic side of architectural photography. In such photos, the building alone is no longer the center of attention (see section 3.2), and the photos illustrate relationships between people and objects rather than just the objects themselves. Examples of this type of photo are ones that clearly illustrate the difference in size between a person and a building or ones that show unusual or odd situations (fig. 147). Other examples of this type of counterpoint are photos that show well-dressed people in front of ruined architecture or persons in Halloween costumes standing in front of a modern skyscraper. Such photos represent a mixture of architectural and portrait photography, so if you are in any doubt, you should always obtain permission to publish from any people who appear in your photos.

Fig. 146: Selective use of a human element to illustrate scale

Fig. 147: An image showing an interaction between a man and a building

In the case of other moving objects, such as cars or clouds (fig. 127), it is often worth waiting to see if the situation changes for the better. Parked cars often block the view of a building and are impossible to remove. In such cases, you can either regard a car as a stationary object and use it as part of the overall composition (fig.

155) or revisit the same location later (figs. 148 and 149). The only other alternative is to select a different location altogether. Like stationary objects, moving objects are an additional stylistic element often used by artistic architectural photographers (fig. 150).

Fig. 148: Parked vehicles block the view of the building

3.8.3 Selective Framing

A photographer can use tight or selective framing to emphasize particular details or characteristics of a building. This eliminates subsidiary information regarding the size and overall shape of a building and draws the viewer's attention to specific architectural details. This way, the material nature of a façade (fig. 151) and the precise construction of particular features are much easier to discern, while the overall structure of the building takes on a secondary role (fig. 152).

Fig. 149: The same building, photographed later

Fig. 150: Deliberate use of a moving object as a stylistic device in an architectural photo [1.5 sec. at f/11 and ISO 100, ND filter]

Fig. 151: A tight crop accentuates the nature of the building materials [focal length: 100mm]

Fig. 152: Substructures within a building's overall shape are accentuated by tight framing [focal length: 150mm]

3.9 Camera Settings

The variable camera settings involved in every photo are shutter speed, aperture, and ISO (film or sensor) sensitivity. The optimum combination of all three ensures correct exposure. As a genre, architectural photography offers little space for experimentation, and it is essential to expose your photos according to the lighting on site if you want to produce usable images that are easy to process.

Fig. 153: Long shutter speeds make movements visible. People who are standing still are more precisely portrayed than those who are moving [0.8 sec. at f/10 and ISO 100, ND filter].

3.9.1 Shutter Speed

Due to the static nature of buildings, shutter speeds (or exposure times, as they are often referred to in digital circles) play only a secondary role in architectural photography. Buildings are not subject to motion blur like many other subjects, so if you use a tripod, your shutter speed will be your most flexible camera setting. If you use long shutter speeds, moving objects such as people or cars end up looking like blurred stripes, which makes them less of a distraction in the finished image. Moving objects can help make an architectural photo look more dynamic and less sterile, and the inclusion of moving people can help illustrate their interaction with the architecture. Moving people create visible blurs and are differentiated from people who are standing still (fig. 153). The longer the shutter speed, the fainter the traces of movement become, so using extremely long shutter speeds is an effective way to make moving objects completely invisible.

3.9.2 Aperture

In architectural situations, it is usually advisable to use a medium to small aperture to ensure sufficient depth of field and to keep lens errors to a minimum. Most wide-angle lenses produce their best frame-wide sharpness at apertures between f/8 and f/11, while very bright lenses (i.e., those with very large maximum apertures) produce their best sharpness at around f/4.

Standard and telephoto lenses often require you to use very small apertures to produce sufficient depth of field. The problem here is that small apertures cause diffraction-based artifacts. This diffraction blur is directly related to the physical size of the aperture opening—the smaller it is, the more likely it is that diffraction blur will occur. The density of pixels on a digital image sensor also plays a significant role in image sharpness. Diffraction blur is more likely to occur in photos shot using a sensor made up of small pixels because the circles of confusion produced by diffraction are more likely to intersect with multiple, neighboring pixels. The smallest aperture that doesn't cause diffraction-based blur is referred to as the "diffraction limit" and lies between f/8 and f/11 for DSLRs with high pixel-density image sensors, while most full-frame DSLRs and medium format digital cameras can be

stopped down to f/11 or f/16 without causing a visible reduction in sharpness.

Fig. 154: Large apertures produce shallow depth of field. Here, the viewer's attention is automatically drawn to the joint between the stones [focal length: 21mm, 1/60 sec. at f/2.8 and ISO 100].

Every architectural photo involves finding the right compromise between the maximum possible depth of field and a minimum of diffraction blur and lens errors. This generally means using an aperture of f/8 or f/11, unless you are using a wide aperture and selective focus to deliberately defocus parts of your subject (fig. 154). Generally speaking, shallow depth of field produces photos in which architecture appears blurred and/or strange.

Fig. 155: An image that uses the grain effect of high-sensitivity black-and-white film as an intrinsic part of the composition

3.9.3 ISO Sensitivity

I recommend that you use the minimum possible ISO value in your architectural photos, regardless of whether you are shooting

digitally or using an analog camera. Low-sensitivity **analog film** produces maximum sharpness with minimum grain, theoretically making it possible to generate large prints of heavily cropped image details. However, in practice it is cheaper and more practical to use high-quality ISO 100 or 200 film, and you should only use more sensitive film if you want to use visible grain as a stylistic device in your images (fig. 155). Slide films are generally not good at reproducing strong light/dark contrasts and are not particularly useful in architectural situations.

Using low ISO values with **digital image sensors** reduces the risk of noise artifacts spoiling your images and gives you the greatest possible dynamic range and headroom for adjusting incorrectly exposed images later on. Some DSLRs offer super-low ISO settings that are theoretically a whole f-stop lower than the default value, but which are only achieved using electronic trickery without producing real increases in image quality. The process involves recording an image that is deliberately overexposed by one f-stop and then automatically corrected by the camera's firmware. This reduces the available dynamic range and should be avoided in high-contrast situations. If you need to use long shutter speeds, it is always better to use a neutral density filter.

3.9.4 Exposure

A camera's automatic exposure metering system uses the selected ISO value as a basis for calculating the optimum combination of aperture and shutter speed for the center-weighted, spot, or matrix area being metered. Generally, architectural photographers aim to produce photos that are precisely exposed across the entire frame, with no obvious burned-out highlights or blocked-up shadows. To achieve this, it is best to use center-weighted or matrix exposure metering, as these—in contrast to spot metering mode—meter for the entire frame. However, automatic systems aren't perfect, and it is sometimes necessary to make manual corrections to automatically calculated exposure settings. Even small reflections can cause the camera to underexpose the whole image. Most digital cameras include histogram functionality to help you judge exposure (see page 120). This is often much more accurate than using the camera's monitor, which is only capable of displaying low-quality images and is subject to color shifts at acute viewing angles.

The prevailing weather and the position of the sun have a significant influence on the exposure values you can use. Contrast is generally low in overcast situations, and it is often advisable to increase contrast artificially for photos taken in such situations—in other words, to “stretch” the histogram. The contrast between the darkest and lightest parts of an image is much greater in direct sunlight. If the sun is behind you, it is relatively simple to produce correctly exposed images. The direct lighting causes some shadows, but leaves buildings showing pleasantly high contrast against relatively dark skies (fig. 156). It is easier to find the right exposure values for the entire frame in situations like this than it is in backlit situations. The façade of a backlit building will be in the shade and will often display very low contrast (see section 3.12.1), while the sky is often overexposed to a degree that overshoots the camera or the film’s available dynamic range, producing large, washed out areas in the finished image (fig. 157). Many automatic exposure systems compensate automatically for backlight, but end up underexposing the main subject as a result. Again, you can compensate for such anomalies manually, but there are limits to what you can effectively achieve as contrast remains high whatever you do. If you cannot avoid shooting into the sun, shoot a bracketing sequence (see section 3.9.5) and use the results to create a super-high-contrast HDR or DRI image later on a computer (fig. 158). A graduated filter can also help in some backlit situations (see section 3.10 and fig. 159).

Fig. 156: The position of the sun behind the photographer produces a high-contrast façade against a dark sky [1/125 sec. at f/11 and ISO 100]

Fig. 157: In this image, backlight gives us a low-contrast façade and an overexposed sky [1/60 sec. at f/11 and ISO 100]

Fig. 158: A DRI image constructed from a bracketing sequence mitigates the problems caused by backlighting [1/10, 1/40, and 1/160 sec. at f/11 and ISO 100]

Fig. 159: Using a graduated filter to counteract the problems caused by backlighting [1/40 sec. at f/11 and ISO 100]

Fig. 160: Using DRI techniques enabled us to produce balanced exposure across the entire frame

3.9.5 Using Bracketing Sequences to Create HDR or DRI Images

HDR (High Dynamic Range) or DRI (Dynamic Range Increase) images are constructed from multiple source images taken using varying exposure values. They make it possible to reproduce a dynamic range greater than what your camera can normally capture in a single image (see also section 4.5). In professional architectural photography, HDR or DRI images shouldn't be

immediately recognizable as such and should provide evenly-lit representations without obvious under or overexposure (fig. 160). If you overdo HDR or DRI effects, you run the risk of producing an artificial-looking image that looks more like a painting than a photograph, with the subject taking on a role that is subordinate to the effect itself (fig. 161). Ideally, you should use a tripod to ensure that the source images in your sequence are identically framed. Select exposure increments of –1/0/+1 or –2/0/+2 LV (1 LV = one f-stop) depending on the situation. These values represent underexposure, normal exposure, and overexposure. Always shoot bracketing sequences using a fixed aperture value and a variable shutter speed. If possible, shoot bracketing sequences in continuous shooting mode—this ensures that your source images are taken within the shortest possible space of time and reduces the risk of objects within the frame moving between shots. If you are shooting at night, use mirror lock-up to prevent the movement of the camera's mirror from causing camera shake.

Fig. 161: The tone mapping effect in this image is too strong

3.10 Using Filters

Filters can be used to produce, enhance, or prevent certain optical effects (see section 2.5.5). Rotating **polarizing filters** are used to prevent unwanted reflections in smooth, nonmetallic surfaces or to intensify the blue of the sky (figs. 162 and 163). **Graduated filters** are a great aid to producing balanced exposures in extreme high-contrast situations and function by partially darkening part of the image area (usually the sky). They are only really effective in situations where the exposure between two clearly differentiated bright and dark areas needs to be equalized (fig. 164). **Neutral density (ND) filters** are color neutral and reduce the amount of light entering the lens by a preset factor. This makes it possible to use much longer shutter speeds than would otherwise be possible in brightly lit situations (fig. 165).

Fig. 162: Use of a circular polarizing filter: the sky remains bright, and there are no visible reflections in the façade

Fig. 163: Rotating the polarizing filter through 45 degrees darkens the sky but makes the reflections in the windows visible

Fig. 164: Two photos, with (right) and without (left) the use of a graduated filter [left: 1/160 sec. at f/9 and ISO 100; right: 1/50 sec. at f/9 and ISO 100]

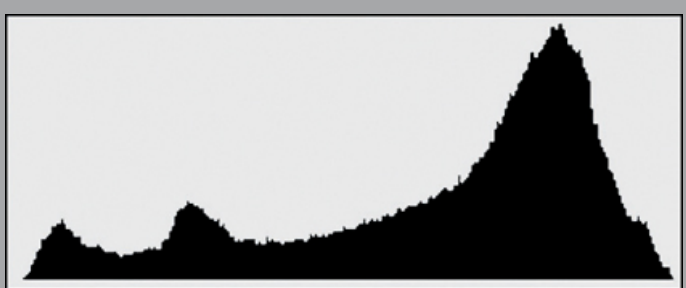
Fig. 165: Using an ND filter in daylight to increase the shutter speed [1/2 sec. at f/11 and ISO 50]

Histograms

A histogram is a graphical representation of the distribution of

brightness levels within an image. The higher a peak, the more often the corresponding brightness value occurs within the frame. A broad histogram curve represents a high-contrast image, while a narrow curve represents one with less overall contrast. Histogram functionality is designed to help photographers judge image exposure. It is an integral part of most image processing programs and is also built into most digital cameras. A histogram allows you to accurately judge the exposure of an image, even if your camera's monitor is quite small or the ambient light is too bright for you to properly see the monitor image. Some cameras even have live histogram functionality, which allows you to see the histogram that your selected exposure values will produce for the scene currently displayed on the monitor or in the viewfinder. An overexposed image will produce a histogram curve that is biased toward the right-hand end of the scale, while an image that is too dark will have more peaks toward the left. If the curve intersects with the ends of the scale, your image is likely to contain burned-out highlights or blocked-up shadows.

Some digital cameras include functionality that displays separate histogram curves for each RGB color channel, enabling you to analyze your images even more precisely.



3.11 Interior Architectural Photography

An interior shoot differs from an exterior shoot in various fundamental ways. Indoors, the space where the photographer can move is limited, and it is impossible to communicate information about the size, shape, or exterior form of a building. Exterior shots portray a solid body that fills space, whereas interior shots portray the space enclosed by an external structure. In interior situations, the volume, sequence, and intersection of the room(s) determine

the nature of the photo.

3.11.1 Interior Subjects

Interior architectural photos portray enclosed space within a building, and the architecture that encloses the space is usually complemented by functional or ornamental interior decoration. It is rare that photographers are offered the opportunity to photograph unfurnished interiors. Interior architectural photos no longer revolve around the overall structure of the building and accents provided by the fixtures and fittings take on greater significance (fig. 166).

The complexity and condition of the fixtures and fittings therefore have a significant effect on the overall mood of the image. The emphasis on the architecture will be less in a photo of a room that is obviously lived-in and looks as if someone has only recently left. These types of photos are more often found in lifestyle magazines than in architectural publications. Familiar everyday objects such as newspapers, paintings, fruit bowls, or potted plants immediately grab a viewer's attention (fig. 167), so it is no surprise that purely architectural interior shots often appear almost clinically uncluttered. A misplaced plant that detracts from the intended effect of the room's design is like a red rag to a bull for most architects. Most superfluous furniture and everyday objects are removed from purely architectural interiors before a shoot, and only a very few objects that set subtle accents become part of the final image (fig. 168). Generally, any object that doesn't help illustrate a room's purpose should not find its way into the shot.

Fig. 166: This shot illustrates a successful interplay between architecture and interior design

Fig. 167: Everyday objects immediately attract the viewer's attention

Fig. 168: An interior shot with few visual accents

Fig. 169: An interior shot that includes a number of carefully arranged props

It is essential to consider how you want to portray a space and how a photo will be used before starting a shoot. You can then arrange the space and its contents—there is always something in a room that doesn't fit into the overall concept. Carry a cleaning cloth for removing dust and grease, as there will always be fingerprints or smudges on smooth or polished surfaces. It is much easier to remove these blemishes before a shoot than it is to retouch them digitally. The same is true for dust and dirt on floors. Once your scene is clean, you can arrange the remaining objects to suit your particular purposes (fig. 169). Chairs that aren't quite aligned with a vanishing point axis or tables that are not quite aligned with a wall can cause unwanted tension in an image and quickly make a scene look cluttered. You have to either arrange everything perfectly or break all the rules by deliberately arranging things out of kilter to attract attention. For example, a photo of a dining table and chairs can be enlivened by moving a single chair slightly to face

the camera. However, if you are in any doubt, leave things tidy—a badly placed accent can spoil an interior image to a much greater degree than a nonexistent one.

Fig. 170: An unconventional subject often makes for an interesting image

By now, you will have realized that a photographer not only has to successfully bring the architecture to the fore, but also the relationship between the building and the objects and fittings within it. As is the case with exterior situations, in photos of interiors it is not the nature of the subject, but rather the feeling communicated by the image that determines whether a photo is successful. Unusual subjects often make exceptional photos (fig. 170) but tend to appear rather abstract.

3.11.2 Perspective and Standpoint

In interior situations, the photographer is located within the space that is to be photographed—a situation that severely limits movement and the number of potential locations for the camera. In order to produce sufficient subject distance and a realistic-looking image, you will often have to stand with your back to a wall or shoot through doors or other gaps in the architecture.

Fig. 171: Central perspective gives this shot a clean, uncluttered look [focal length: 17mm]

Interior spaces usually have square or rectangular floor plans, giving the photographer the basic choice of a shooting with **central** or **two-point perspective** (see also section 3.3.1). A central perspective photo (fig. 171) involves positioning the camera along the room's central axis and shooting in the direction of the rear wall. The wall is oriented parallel to the sensor/film plane, limiting the depth, and preventing the appearance of converging lines within the wall. This type of composition works well in small rooms, although the overall effect is not particularly dynamic. The larger a room, the farther away the rear wall and the more accentuated the feeling of depth will be. In very large rooms, the walls' strongly converging horizontal lines contribute to the dynamic effect of the resulting image. This effect is particularly strong in images of symmetrical spaces that are shot to emphasize their symmetry (fig. 179).

Fig. 172: The same room photographed using two-point perspective. The overall effect is much more dynamic, and all horizontal lines converge toward the vanishing points [focal length: 17mm]

In order to create a photo with two-point perspective, we have to shoot diagonally into the space. This means that all nonvertical lines converge towards imaginary vanishing points on the (usually invisible) horizon and contribute to the feeling of style and depth (fig. 172). However, this type of image is sometimes too dramatic and can result in inharmonious compositions, especially in narrow spaces. The viewpoint you choose will depend not only on how you wish the finished image to look, but also on physical limitations, such as the arrangement of the furniture or fittings. You may find that it is simply impossible to shoot using central perspective because the corresponding parts of the room are full, or because a central viewpoint would produce unwanted reflections that require subsequent retouching (figs. 173 and 174). The direction from which light enters the space or the presence of mixed light sources will also influence your choice of standpoint.

Fig. 173: Overview of a space photographed using central perspective. This results in unwanted reflections of the camera and tripod.

Fig. 174: The same space photographed using two-point perspective. This version contains no unwanted reflections but produces a very different perspective effect.

Fig. 175: Shooting at eye level gives a photo a natural look and feel [focal length: 24mm]

Fig. 176: Converging verticals are used as part of the composition in this photo of a high ceiling [focal length: 17mm]

Shooting at eye level (approximately 6 ft above ground level) produces natural-looking interior shots (fig. 175). The viewer usually instinctively assumes that interior shots have been taken from this position, and you can make lowceilinged rooms appear more spacious if you shoot from slightly lower (between about 3 ft

and 4 ft above the floor). However, lower camera positions also increase the risk of some objects within the space blocking the view of others. You should also consider, for example, whether the view under a table is preferable to the view along its surface. Only shoot from above eye level if you have to—for example, to prevent a piece of furniture or an architectural feature from spoiling your composition. Shooting above eye level can also be necessary if you need to emphasize the depth of distant objects within a space.

Converging verticals are less of a problem in interior situations than they can be when shooting outdoors. This is because the difference between the height of the space being photographed and the vertical scope of the image is much less pronounced compared to an exterior shot. Interior shots contain fewer important visual elements in the upper parts of the frame, so it is easier to keep the camera level than it is in exterior situations. However, it is just as important to ensure that your camera is aligned correctly or that it will be possible to correct converging verticals later on. Even slightly off-kilter verticals quickly make interior shots look strange. An exception to this rule occurs when we are photographing the interiors of churches and other extremely high-ceilinged spaces. In this case, we encounter similar problems with regard to converging verticals as we do when photographing very tall buildings from the outside. A shift lens can be an enormous help, and if all else fails, you can simply make the converging verticals part of your composition (fig. 176). Some outdoor subjects, such as market squares or enclosed courtyards, exhibit characteristics that are more similar to an indoor than an outdoor shoot, and need to be handled as such.

3.11.3 Focal Length

Because of the limited space available and the restrictions this makes on your choice of camera position, wide-angle lenses are the best choice for shooting interior scenes. Their large angles of view combined with short subject distances often create an impression of space that exceeds that of the room being photographed, which can produce photos with misleading proportions. In contrast to most exterior situations, in which realistic reproduction of size and space are very important, most architectural photographers accept the disproportionate nature of interior shots, especially as this rarely

spoils and can sometimes even enhance the effect of the design (fig. 177). It is nevertheless important to exercise caution when selecting your lens. A good rule of thumb for choosing focal length is: As short as necessary but as long as possible. Our aim is not to test the physical limits of our equipment, but rather to produce interestingly composed, well-lit images with a clear message. Extreme wide-angle effects are seldom beneficial to an image. Having said all that, there is, of course, nothing to be said against using ultra-wide-angle lenses to produce intentionally artistic effects.

Fig. 177: Using a very short lens and a short subject distance produces a feeling of space that is greater than what really exists [focal length: 14mm]

It has often been observed that the higher a room and the less depth it has, the wider the angle of a lens should be to produce a balanced composition that reflects the proportions of the real, three-dimensional space. The opposite is also true: low, long spaces require longer lenses to produce harmonious-looking results without tunnel-like effects. Remember, you can exercise significant influence on the spatial effects in an image and prevent unwanted anomalies with careful use of different focal length lenses.

3.11.4 Image Formats

If you want your results to look authentic, the format you choose should reflect the overall proportions of the space you are photographing (fig. 178). Generally, the opportunities to work against this rule are limited by the size and positions of the elements within the image. Experimental formats that don't reflect the orientation of the space you are working in usually produce sub-standard results. Portrait format shots of low, wide rooms are rarely satisfying and give too much emphasis to the less interesting ceiling and floor areas. Most interior shots are taken in landscape format.

Especially under cramped conditions, ultra-wide-angle lenses and panorama techniques can be used to capture images of large spaces (fig. 179). If you are shooting indoor panoramas, remember that the relatively close proximity of the subject matter will increase the degree of potential optical shifts from source image to source image, making it essential to plan and execute your shoot very accurately.

Fig. 178: The image format here was chosen to accommodate the dominant feature of the image

Fig. 179: A shift panorama constructed from multiple source images [focal length: 2 x 24mm]

Fig. 180: An artistic, almost abstract view created by shooting vertically downward into a spiral staircase

Fig. 181: An interior shot composed according to the Golden Ratio

3.11.5 Framing and Composition

The same rules that apply to producing interesting and effective exterior shots also apply to interior situations, although in this

case, the photographer's room to maneuver is noticeably limited. Including elements of the surroundings or the sky is impossible, and composing a shot to include just one specific part of a room quickly reduces the magnitude of the photo to a scale at which the building is no longer recognizable as such. Here, individual architectural details or aspects of the interior design take on the role of the main subject. However, these limitations also present opportunities for taking a more artistic approach to your photography (fig. 180) without having to resort to using two-dimensional or monotonous compositions. Skylights, staircases, and mirrors are great features for experimentation.

It is important to analyze each room individually and to look for ways to accent its best features. The rule of thirds and the golden ratio (fig. 181) are both useful guidelines for producing well-proportioned images, while creative use of doorways, arches, and other gaps in the surrounding structure often helps to produce interesting and unusual photos. Portraying the transition from an interior to an exterior view also offers a whole range of new photographic possibilities (fig. 182).

Because they tend to dominate the scene and attract the viewer's attention, people are rarely included in interior shots. People also take the emphasis away form the structural side of the image and give it an overly personal touch. Because the size of the windows, doors, and other fittings are implicit within the space being photographed, human subjects are also rarely required to illustrate scale.

Fig. 182: An interior shot illustrating the transition from interior to exterior space

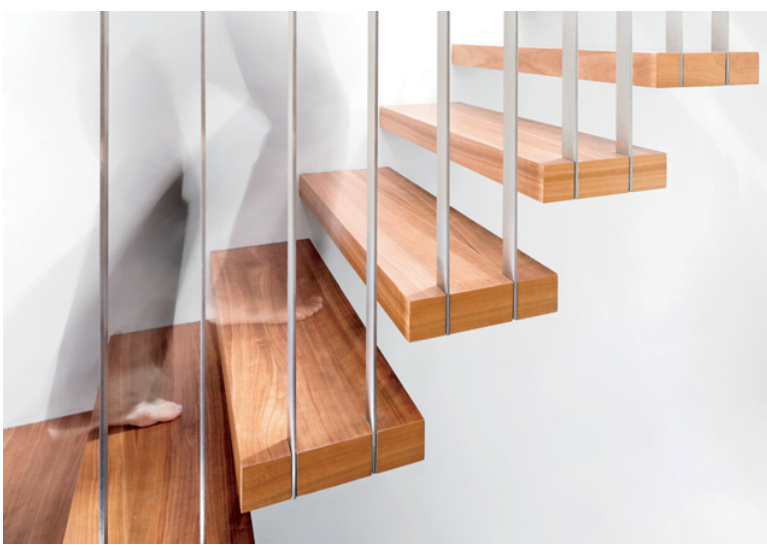


Fig. 183: Using movement to add artistic flair to an interior shot [0.8 sec. at f/10 and ISO 100]

If a precise representation of the design is less important, you can use artistically blurred or implied human subjects to emphasize the feeling of space in an interior shot (fig. 183).

3.11.6 Camera Settings and Lighting

The ideal camera settings are generally the same for interior and exterior shots. Because it is usually darker inside a building than outside, a tripod is absolutely essential for preventing the camera shake that longer shutter speeds would otherwise cause. The differences in interior and exterior lighting are particularly obvious in and around windows, which often produce extreme ranges of contrast that neither digital nor analog cameras can capture in a single image. You can counteract the resulting overbright highlights or detail-free shadows in a number of ways.

The simplest approach is to simply accept that windows will appear extremely bright and detail-free if you want to produce a balanced exposure for the rest of a room. It is often the case that objects and elements outside the room are irrelevant or distracting anyway. All you have to do is take a matrix or center-weighted meter reading for an average bright area that contains no windows. Once you have either selected your exposure values (in manual mode) or saved the meter reading (refer to your camera's manual to identify the appropriate button), you can reframe the image to include the overbright areas and release the shutter. Always use the histogram display to make sure you have captured the maximum possible range of tonal values—the histogram curve should reach but not intersect with the left-hand (shadow) end of the scale and should cross the right-hand (highlight) end at as low a level as possible.

Another way to balance interior and exterior lighting is to use wirelessly controlled flash units positioned to produce no obvious shadows but so that they are themselves not visible within the frame. Ideally, the resulting effect will make it look as if the darker areas of the scene are lit by natural light. Unfortunately, the powerful, flexible flash units necessary to create this type of effect are beyond the budget of many hobby photographers. In place of these flash units, they can use one or more of the dedicated flash units sold by major camera manufacturers that have built-in infrared or radio-based control functionality. Some systems also allow you to use your camera's built-in flash unit as a "master" unit to control additional off-camera "slave" units.

The larger the room and the brighter the light entering the windows, the more difficult it is to produce adequate lighting using

conventional flash equipment. One way to work around this type of problem is to deliberately underexpose to keep details beyond the windows visible and to light the rest of the frame by firing several indirect flashes in different directions while the shutter is open. If the shutter speed you are using makes it impossible to fire multiple flashes during the exposure, you can always use a sequence of images to produce the result you are looking for. Position your flash for each image so that it illuminates a different part of the scene without itself being visible in the frame, but try to avoid positioning it behind or to the side of the camera. It is then relatively simple to use layers and masks in an image processing program to merge a sequence of source photos into a single, well-exposed image. There is also specialized software available for performing light-balancing tasks, such as HDR ReLight by Oloneo, which allows you to control the impact of the light sources in your source images individually. This technique can also be used to photograph unlit rooms with no windows at all (fig. 184). And remember, it is virtually impossible to exactly reproduce the mood of the lighting built into a building's design if you use flash as a subsidiary light source.

Fig. 184: A photo of a dark interior created by merging several source images illuminated using an off-camera flash

Fig. 185: An interior shot created using subtle DRI effects

Another effective way to produce interior shots with balanced lighting is to shoot a bracketing sequence and merge the resulting images using HDR or DRI techniques. This ensures that the finished image contains detail across the entire frame and that deep shadows and bright highlights are not clipped. It is important not to overdo HDR and DRI effects, as they can quickly produce unrealistic-looking results (fig. 185). Don't attempt to darken your highlights so much that they could pass for midtones, as this only produces photos that look like paintings. Always aim to keep contrast realistic-looking while preserving visible detail in both highlight and shadow areas. A bracketing sequence should consist of at least three or, in situations with an extreme range of contrast, five source images with exposure values ranging between +2 and -2.

If you want to be able to adjust white balance after shooting, you will have to shoot using your camera's native RAW format. This is especially important in situations where the color temperatures of the interior (warm) and exterior (cold) light sources differ widely. If you use additional flash to brighten a room that has little or no artificial light, you can use special blue-colored filter gels (for example from LEE Filters) attached to the flash to adjust the temperature of the flash light to match the immediate environment. There are also filters available that warm flash light to match a

dominant artificial light source if there is little or no exterior light. Bright room lights strongly accentuate the differences between the color temperatures of artifical and incident natural light. Additional lighting challenges include multiple artificial light sources with different color temperatures; the simplest workaround here is simply to switch off any lamps whose color temperature differs widely from the dominant light source. Some photographers even attach colored gels to windows in order to match the outside light to the artificial indoor light, but this is a very complex and time-consuming approach. A simpler solution is to retouch the blue cast during post-processing or to shoot once it gets dark. But take care: The light is still extremely cold during the blue hour (see section 3.12.3). If you are using HDR or DRI techniques and your image contains a significant amount of natural light, you can use cooler white balance settings to “develop” the overexposed source images and warmer settings for the underexposed ones. This technique assumes that brighter image areas are lit by daylight and that darker areas are lit artificially. It is an effective way to attenuate strong differences in color temperature, even if it cannot eliminate them entirely.

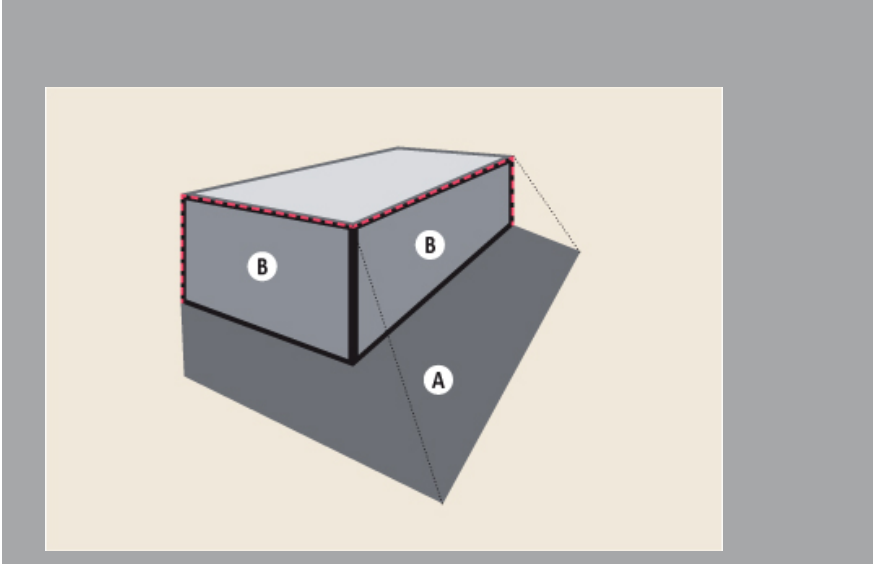
Fig. 186: Bright overall lighting emphasizes the modern appearance of this medical center

There are no hard and fast rules governing the number and strength of lamps you can use to light a room. Bright overall lighting is better in some situations (fig. 186), while selective use of individual accents is better in others. If, for example, the sun is low in the sky and its light enters the room via a window, the best solution can be to do without artificial light altogether (fig. 187). If in doubt, the best solution is to give yourself a choice by taking multiple shots of a single scene using as many different lighting setups as possible.

Fig. 187: An artistic interior shot created without the use of artificial light

The Effects of Shadows

In architectural photography, one often deals with various manifestations of shadows. They are usually caused by nearly parallel rays of light coming from the main light source present in almost all architectural photographs: the sun. A cast shadow is the shadow of an object (A) projected on to a surface or other objects. An object will also create its own shadow, which covers the surface facing away from the light source (B). This area is only lit indirectly by reflections coming from the surrounding area. It is interesting to note that the edge of the cast shadow is originated by the edge of the object's own shadow (represented by the dotted red line).



3.12 External Factors That Influence a Shoot

These are the factors influencing a shoot that you can do little or nothing about. The photographer's approach to dealing with these factors is critical to the success of an architectural photo.

3.12.1 Shadows and Reflections

Shadows and reflections caused by the sun can have positive and negative effects on the look and feel of an architectural photo.

Shadows cast by other buildings or objects produce silhouettes on a building's façade, walls, roof, or the surrounding ground, while their nature is influenced by the position of the sun. A hard shadow that falls across the entire front of a building can spoil the aesthetics of the architecture and makes calculating the correct exposure values extremely difficult (fig. 188). However, this type of situation is relatively easy to work around using either a graduated filter or HDR/DRI merging techniques. Shadows can also have positive effects on the appearance of a building, especially if it has an otherwise monotone or two-dimensional look. In this case, a shadow can form a compositional element of its own and add to the dynamics of the image (fig. 189).

Fig. 188: A hard shadow cast by a neighboring building makes it difficult to expose this façade correctly

Fig. 189: The obvious shadows have been deliberately used to enliven this image

Fig. 190: Here, a carefully selected viewpoint prevented the photographer's own shadow from entering the frame

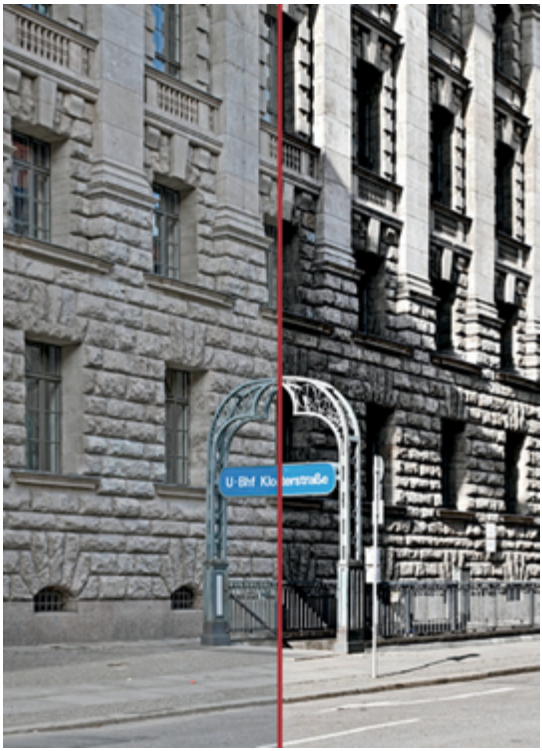


Fig. 191: A façade located in the building's own shadow (left) and directly lit (right)

Protrusions and depressions in a building's façade often produce short, dark shadows that are an integral part of the look of the architecture. If the sun is low in the sky and positioned behind you, you run the risk of including your own shadow or that of your camera/tripod in the image. In such situations, the best solution is to alter your standpoint until your own shadow is covered by that of another building or object (fig. 190). Failing that, you will simply have to look for an alternative camera angle.

Façades that fall within a building's own shadow exhibit much lower contrast than parts of the building that are directly lit, and appear dull and two-dimensional as a result. However, directly lit parts of a building often display less detail than shaded parts due to the effect of the very dark shadows and extremely bright highlights they include (fig. 191).

Reflections can cause effects similar to shadows, with similarly positive or negative results (fig. 192). They are more or less

pronounced, depending on the material of the façade—for example, modern glass often reflects nearby buildings (fig. 193), thereby emphasizing the nature of the material. This type of effect can be so dominant that it actually overshadows the effect of the architecture itself.

Fig. 192: Reflections enhance the dynamic aesthetics of this image

Fig. 193: The nature of the material in the foreground produces an additional visual level reflected in the façade

Fig. 194: Direct sunlight produces tactile images with intense colors and strong shadows

Fig. 195: A cloudy sky gives the same scene a low-contrast look with soft shadows

3.12.2 The Effects of Weather

The weather is a factor that we cannot influence at all but which

can have a significant effect on the appearance of a building. Direct sunlight with few or no clouds produces dark shadows, bright reflections, high image contrast, intense colors, and a highly tactile overall look and feel. Such conditions can produce very aesthetic images and show the building in its best light, so to speak (fig. 194).

On the other hand, cloudy skies produce much lower contrast with soft shadows and a much more diffuse overall look. The light is scattered over a wide area, and the transitions between bright and dark areas are much softer (fig. 195). Reflections, too, are less intense. Cloudy situations give architecture a generally less vivid look—an effect that is not necessarily a disadvantage. North-facing façades are much easier to photograph under cloudy conditions, due to the reduced intensity of the backlight implicit in such situations (fig. 196).

Wait for the most neutral weather conditions possible if you are shooting for documentary purposes—i.e., try to shoot in typical local conditions. Unusual weather conditions, such as a beach hut surrounded by snow, produce an unauthentic look. If you are shooting for artistic purposes, you can, of course, include as many contradictions in your image as you like, and dramatic weather is great for attracting a viewer's interest. The time during or just after a shower of rain is perfect for capturing otherwise nonexistent reflections (fig. 197). Snow and fog, too, are elements that can be used in the creation of surreal but interesting architectural photos.

Fig. 196: Clouds reduce the strength of the backlight and make it easier to expose this shot of a north-facing façade

Fig. 197: A recent shower of rain provides an additional reflective element

Fig. 198: Shot at the beginning of the "blue hour" [2 seconds at f/11 and ISO 100]

3.12.3 Choosing the Right Time of Day

The time of day is the factor the a photographer can influence most. Under cloudy skies, the differences between morning and afternoon light are negligible, whereas bright sunlight can produce a wide variety of lighting situations in the course of a day—façades that are in the shade in the morning can be directly lit at midday. The time of day also influences the shape and intensity of shadows cast by other objects, and some buildings are only lit by sunlight for a short phase of each day. It is always a good idea to research your planned location in advance of a shoot using maps or online satellite images.

An especially interesting time for architectural photographers is the so-called "blue hour" that occurs just after sunset when the sky is still indirectly lit by the sun and artificial light begins to have an effect on a scene. Photos shot at this time of day are well known for the color of the sky and their intense overall mood. In contrast to night shots, the unlit areas of blue hour photos are still indirectly brightened (figs. 198 and 199). The same effect—caused by the

stray light emanating from the invisible sun—also occurs in the early morning.

Fig. 199: Shot toward the end of the "blue hour" [10 seconds at f/9 and ISO 100]

During and after nightfall, the lighting emphasis in most architectural scenes is reversed, and a building's interior, which is difficult to see in daytime, becomes the glowing central subject at night. Windows, which are often the darkest and most reflective elements of a façade during the day, become blazing transparent surfaces at night (fig. 200). In contrast, darker parts of a building often appear formless in the dark. Using HDR or DRI techniques is a great way to produce balanced contrast in night shots.

Fig. 200: A classic night shot with an impressively glowing subject [20 seconds at f/6.7 and ISO 100]

Fig. 201: The seasonal coloring of the surrounding vegetation is an important factor in the overall look of an image

3.12.4 The Effects of the Seasons

The season is the external factor that you will least be able to influence, and the appearance of the vegetation surrounding a building will change significantly in the course of the year. Leafy trees can block the view of a building in summer, but present no problem in winter. Autumnal colors give an image a completely different look than springtime green (fig. 201). These types of impressions have an immediate and obvious effect on the look and feel of an architectural photo. Cool blue tones will always produce different feelings in a viewer than warmer yellow or red tones.

Fig. 202: Shot in late summer at midday, the sun is high in the sky and gives this image strong colors and contrast

Fig. 203: The same scene shot in winter, again at midday. The overall look is cooler, and the low sun provides diffuse light.

The sun's path changes with the seasons, too. The light from a low winter sun has farther to travel through the Earth's atmosphere, making it more diffuse than summer sunlight. Winter sunlight also produces long shadows and is often the cause of backlit situations, making a balanced exposure more difficult to achieve. The summer sun is high in the sky and casts short shadows that give buildings a more immediate, accented look (figs. 202 and 203).

Fig. 204: Tight framing adds emphasis to the shapes and structures within the building [focal length: 70mm]

3.13 Creative Tips and Tricks

The following sections give details of selected tips and tricks for taking creative architectural photos.

3.13.1 Extreme Framing

Clever composition combined with tight framing accentuates detail and gives a building a completely new, stylized look (fig. 204). An extension of the same idea involves layering multiple details to form complex, almost completely abstract images that can be quite difficult to interpret (fig. 205). Tight crops that contain no guides to scale can also appear quite abstract (fig. 206). You can use techniques like these to alter the appearance of a building so as to make it unrecognizable. The textures and patterns within its design become a part of a graphical whole, while the actual architecture takes on a background role (fig. 207).

Fig. 205: Using multiple visual layers produces an abstract effect [focal length: 88mm]

Fig. 206: A lack of reference objects makes it impossible to judge the scale of the subject

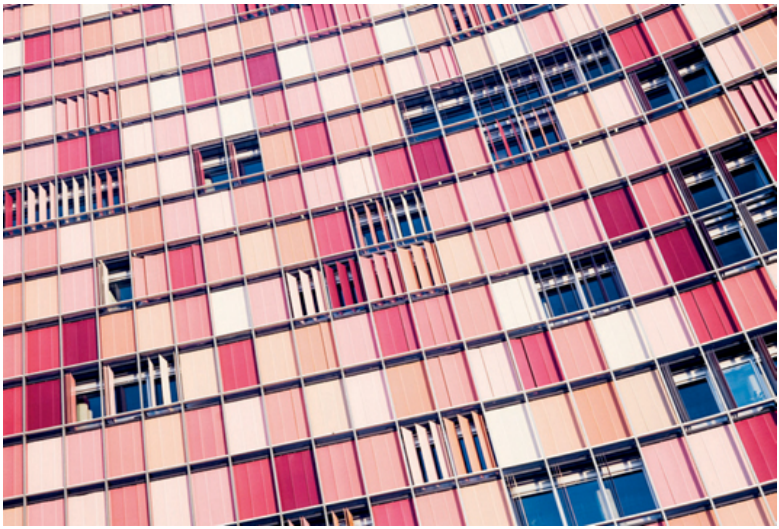


Fig. 207: Extreme framing brings shapes, patterns, and colors to the forefront in this image [focal length: 40mm]

Fig. 208: An image sequence: combining multiple images with a common theme gives individual photos a new and interesting context

Fig. 209: The unusual camera position looking straight upward gives this image an interesting but unfamiliar look [focal length: 17mm]

3.13.2 Image Sequences

Another way to photograph buildings creatively is to shoot a sequence that gives multiple images a mutual context. Our example shows a sequence with a “doors” theme (fig. 208). As long as the theme is clearly recognizable, materials, colors, lighting, and exposure can vary widely from image to image. Selecting the right images to display is an integral part of shooting a successful sequence—one of the more artistic approaches to architectural photography.

3.13.3 Shooting Upwards

Human beings generally perceive their surroundings on a horizontal plane by looking forward, and we rarely allow the horizon to leave our field of view. Looking upward produces an unusual, unfamiliar view of a building that lacks context and confuses our perception of spatial relations (fig. 209). This type of view, especially in interior situations (fig. 32), can convince the viewer that a wall is a ceiling or vice versa. The sky suddenly becomes a large, uniform background that is perfect for setting off

the features of the subject. A vertical view also allows you to rotate the frame in any direction without breaking any fundamental rules of composition (fig. 210).

Fig. 210: Large areas of sky set the stage for the receding skyscrapers in this overhead shot [focal length: 14mm]

3.13.4 Extreme Use of Reflections

Reflections are particularly effective if they produce a second, separate visual layer within an image. Again, clever composition in combination with reflective materials can produce images with a deeper message or a symbolic feel—for example, by combining elements of old and new, light and heavy, or transparent and opaque (fig. 211).

Reflections can be so abstract that the viewer no longer comprehends what he/she is seeing. Extreme compositions created using layering or sequential techniques can be used to create crazy mixtures of shapes, textures, and details. In such cases, the architecture itself becomes a mere background on which you can project your own personal message (fig. 212).

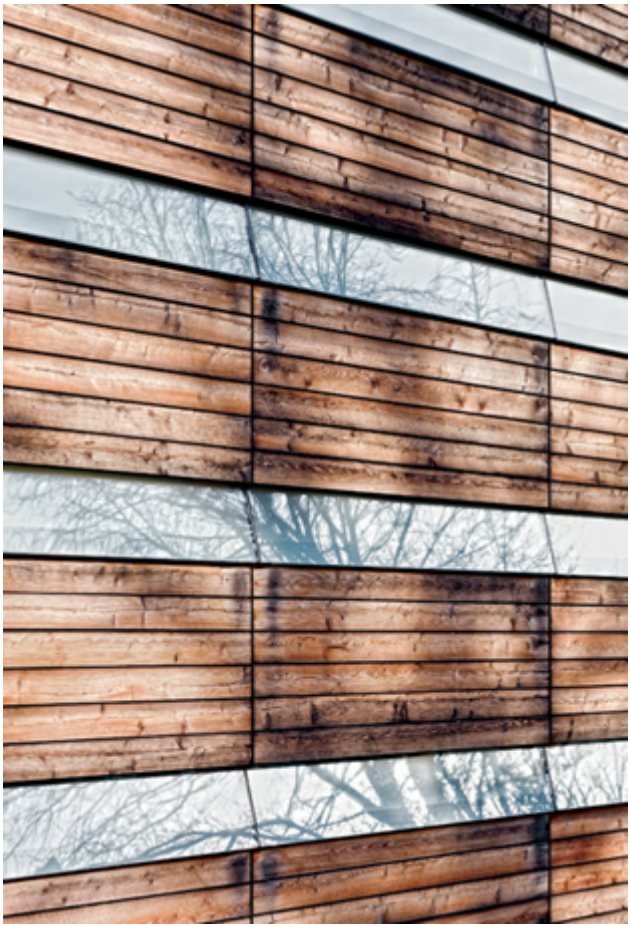


Fig. 211: An example of implicit symbolism through reflection: here, wood is simultaneously reflected in its original form and used in processed form as a building material

Fig. 212: Ambiguous spatial relations produced by strong reflections

3.13.5 Selective Over- and Underexposure

Using selective under- or overexposure is another way to give your architectural photos a unique creative edge. Deliberate **underexposure** emphasizes brighter details within the frame while further darkening midtones and shadows, creating a surreal, bleak look (fig. 213). Selective **overexposure** has the opposite effect. All zones that contain brightness above a certain level are reproduced in white, give an image a frameless, floating look (fig. 214). The emphasis on form and texture makes this type of photo less authentic and more artistic. This is why under-and overexposed images often remind the viewer of computer-generated or graphic

illustrations.

Fig. 213: Creating a particular look using deliberate underexposure ...

3.13.6 “Before and After” Views

Comparing views of a building at different times is an effective way to illustrate the passage of time. In an architectural context, this technique can be used to show a building from the same viewpoint but at different times of year, or at various stages in the course of its construction (fig. 215). Other examples are views of a building before and after renovation or a change of owner.

Fig. 214: ... or using deliberate overexposure

Fig. 215: “Before and After” views of a subject are real eyecatchers

3.13.7 Fake Miniatures

The tilt function of a tilt/shift lens can be used to create so-called “fake miniatures”. This technique involves tilting the plane of focus so that just a very small portion of the potential depth of the image remains sharp while all other details recede into blur (fig. 216). The resulting shallow depth of field (normally associated with close-up photography) makes photos of life-size subjects look like miniature scale models. Optically, this effect can only be produced using tiltable lenses, with longer lenses producing a stronger effect than shorter ones. Even at wide apertures, regular lenses produce too much depth of field to create this type of effect.

Fake miniature effects are most effective in shots taken from a raised viewpoint, such as a bridge or a tower. The more individual objects in the scene and the greater the subject distance, the more striking the effect will be. Objects that are too close to the camera tend to spoil the overall effect. Fake miniature effects can also be produced digitally (see section 4.6.4).

Fig. 216: Using a tilt/shift lens to create a fake miniature effect

3.14 Solutions to Common Problems

Shooting HDR source images without a tripod: Merging a bracketing sequence into an HDR/DRI image is an effective way to capture high-contrast subjects that exceed your camera's normal dynamic range. It is still possible to shoot usable sequences of source images, even if you don't happen to have a tripod with you.

HDR and DRI source images have to be framed identically to be effective. If you try to merge images that are framed slightly differently, some details will not overlap correctly and the merged image will be spoiled. The closer your subject, the more obvious slight differences in perspective become, so it is essential to keep camera movements between shots to a minimum if you are shooting without a tripod. Combined with bracketing functionality, continuous shooting mode allows you to shoot a sequence of differently exposed images handheld in a very short space of time and with only minimal shifts of camera position. Make sure that the longest exposure of your sequence isn't so long that it includes visible camera shake. But remember, you will still have to align your source images digitally, making handheld bracketing sequences at best a makeshift solution that only works if the scene you want to capture is brightly lit.

Shooting shake-free photos without using a remote release: If you are shooting in low light using a tripod, it is always preferable to use a remote shutter release to prevent camera shake. If you don't have a remote release on hand, your camera's self-timer can help you avoid camera shake caused by human contact with the camera. Using the camera's mirror lock-up feature improves the situation further by ensuring that the movements of the mirror aren't transmitted to the camera body while the shutter is open.

The self-timer's built-in delay means that you cannot precisely determine the moment at which the shutter is released, so if you cannot live with this limitation you will have to release the shutter by hand. This is not usually a problem in daylight, but the longer shutter speeds required in low light make things more difficult. You can reduce vibration if you support the hand pressing the shutter button with your other hand, and the heavier your tripod, the less of a problem camera shake will be.

Preventing blurred images and camera shake: Bad weather and low light quickly extend shutter speeds to a point at which you can no longer shoot handheld. A simple formula—1 / (Focal Length x Crop Factor)—provides you with the shortest usable shutter speed for most situations. For example, a camera with a Four Thirds sensor (crop factor 2) and a 200mm lens requires the use of a minimum shutter speed of 1 / (200 x 2) = 1/400 second. This rule was originally formulated in the analog age to cater to small-scale prints. If you are using a camera with a particularly high-resolution sensor, or if you want to make very large prints, camera shake may become visible sooner. If you are in any doubt, always select a shorter shutter speed. Many contemporary DSLRs and lenses are equipped with built-in image stabilizing functionality, although these systems, too, have physical limits beyond which they are not completely reliable.

Fig. 217: A handheld night shot taken using a high ISO value [focal length: 24mm, 1/25 sec. at f/4, and ISO 3200]

When using a modern DSLR in low light, you can increase the ISO value, but remember that higher ISO values nearly always increase the amount of visible noise and reduce the available dynamic range in your images.

Opening the lens to a medium aperture value will help to reduce the risk of camera shake, but it is generally inadvisable to shoot architectural photos with the maximum aperture, especially if you are not using a high-end lens. Wide apertures produce more visible lens errors, so only use your maximum aperture if you have already increased your ISO value as far as you can. A correctly exposed image using a high ISO value (fig. 217) nearly always looks better than one with edge blur, chromatic aberrations, vignettes, or too little depth of field.

One of the simplest ways to prevent camera shake is to use found objects such as walls, balustrades, ledges, tables, chairs, or even parked cars as a kind of emergency tripod. Use a soft cloth or bag to prevent your chosen surface from scratching your camera, or vice versa. A beanbag made of cloth or leather also provides a soft, flexible support for your camera that allows for slight camera adjustments, and absorbs vibrations too. If there is no horizontal surface at hand, you can even use the walls of a building to support your camera (and a fingertip to support the lens) while taking portrait format shots.

A real old-school method of preventing camera shake involves tying a non-elastic string between the camera body and one of your feet. Shorten the string to a length at which it is taut when you are holding your camera in its normal shooting position. This is a simple but effective way to reduce the camera shake caused by minimal hand tremble.

If none of the above options apply to your situation, you will simply have to rely on the steadiness of your hand. Leaning against walls is a useful way to keep your body steady when you are shooting handheld. Breathe steadily and try to release the shutter between breaths. In critical situations, taking multiple shots of a subject increases your chances of producing at least one shake-free image.

Comments by Marcus Bredt

On architectural photography in general

At first glance, architecture appears to be an easy subject—buildings don't move, don't need to be given instructions, and are available at all hours of the day and night. The tricky part of the job is getting to know the subject well enough to shed new light on an apparently everyday object. We walk past countless unobtrusive office buildings every day, and we usually use railway stations for their intended purpose without giving them a second glance. We do not generally consider factories and warehouses to be works of art. Our job is to make objects that are normally ignored interesting. This can be achieved by accentuating geometric form to the point at which its intrinsic aesthetic grace suddenly becomes apparent, or by capturing tiny details of a subject's surroundings in such a way that an otherwise desolate-looking building develops its own particular beauty. But remember, a great architectural photo has nothing to do with clever effects or disguising the subject's true nature (fig. 218).

On taking your first steps as an architectural photographer

It is, of course, a lot of fun to try out new effects, especially when you are starting out. Experimentation with technical tricks and clever techniques is the only way to find your own style. But the subject itself is always more important, and a great building often guarantees a great photo. In this respect, our first assignments for Daniel Libeskind were a real blessing. His spectacular architecture cries out to be photographed under a multitude of lighting conditions and from a variety of adventurous viewpoints. I still like the images that we produced back then, even if we have progressed a great deal since. It takes a long time to develop your own personal style, and while good technique helps, style still has a lot to do with gut feelings and

intuition.

Fig. 218: The Denver Art Museum. Photo: Marcus Bredt

On architectural photography as a profession

Nowadays, many subjects present themselves without a search. Much of my work is, of course, commissioned, but is nevertheless subject to the variety of perspectives, lighting situations, processing steps, and random events that accompany every job. Architectural photography is anything but simply taking snaps of a building, and a building is much more than just a cleverly arranged collection of materials. You can only learn to perceive a building as a congruent whole once technical

questions are no longer an issue and you can concentrate completely on seeing, hearing, smelling, and tasting the multifarious nature of the subject. When I consider a new project, I often find that before I have had a chance to come to grips with it, the building itself actually engages with me, and we develop a dialog together. A building isn't just an object that I get to look at, and it can only develop into the subject of a photograph if I work on my relationship with it. This work involves including the weather, the surroundings, the building's function, and life as a whole in my overall view.

It is very important to me to show that we not only live within our environment, but also with it. Just the same way as we affect urban planning, natural processes, and the people we meet, these things affect us too in equal measures (fig. 219). Architecture isn't just about static buildings; it also requires us to successfully pair function with art and artifice with nature. It embodies the never-ending dialog between man and material, between technology and nature. Capturing this dialog and making its vibrancy visible for a split second is a constant source of wonder to me. Any number of tiny internal or external changes can have a major effect on the overall look of a composition. A fleeting moment, past and present, stasis and flux, perception and experience can all be united by the single press of a shutter button (fig. 220). Capturing myself and the moment forever in an image is the real reward for the unending search for the "right" visual effect.

An architectural photographer's most important partners are without doubt the light and the weather. A building under a clear blue sky looks chic, but often makes for a dull image that has too much contrast. Clouds, rain, or fog have much more to offer, and are often the key elements of a fascinating photo (fig. 221).

Architecture can be simply recorded, but can also tell its own story. I like to compose images that tell stories, although I always make sure that the story accentuates the subject rather than overshadowing it. Architectural images tell different types of stories, from high-speed sequences, to slow and deliberate observation of detail, to romantic moments and ephemeral comedy. Some images appear contradictory—the story seems not to match the location, color contrasts disappear in a blur, or a fragment of nature enters a bizarre relationship with modern

technology. Such photographs have their own special charm and have a magical effect on the viewer (figs. 222 and 223).

Fig. 219: The Denver Art Museum. Photo: Marcus Bredt

Fig. 220: Berlin Central Station. Photo: Marcus Bredt

Fig. 221: The Olympic Stadium in Berlin. Photo: Marcus Bredt

Vita

Marcus Bredt was born in 1968 in Göttingen, Germany and lives and works as a photographer in Berlin. After finishing his professional training at Lette-Verein in Berlin, he co-founded the BitterBredt photo agency and has shot architectural projects for clients that include Libeskind, Langhof, and Sauerbruch Hutton, as well as for magazines and institutions such as the Gerhart Hauptmann Association.

Fig. 222: Contemporary Jewish Museum of San Francisco. Photo: Marcus Bredt

Fig. 223: Detail. Photo: Marcus Bredt

4 Image Processing

This chapter deals with the computer-based processing steps that you can apply to your images after shooting. Before you can begin processing digital images, you have to load them onto your computer using either the connection cable provided with your camera or a memory card reader attached directly to the computer. Digital images can be stored and processed in the form of preprocessed JPEG or TIFF files or as RAW files, which are the digital equivalent to analog negatives, and provide you with the maximum possible amount of usable image data. RAW files can also be processed a limitless number of times without actually altering the original image data. If you are shooting analog originals, these will first have to be digitized using a scanner before you can process them. High-end digitizers produce much better quality scans than hobby-grade flatbed or film scanners. Once you have scanned them, you can process, optimize, and present your analog images in just as many ways as you can your digital originals.

4.1 Digital Image Formats

4.1.1 What Is RAW?

RAW image formats are proprietary not only to each camera manufacturer, but also to individual camera models, and save image data in its purest possible form with virtually no intervention from the camera's firmware. A piece of software called a RAW converter is required to perform subsequent processing and conversion to universally readable formats.

4.1.2 The Differences Between JPEG and RAW

In contrast to the popular JPEG format, RAW image data is saved to the camera's memory card losslessly and at full color depth. Image parameters such as white balance, color saturation, contrast, noise reduction, and sharpening are saved separately from the actual image data and can therefore be altered later without

reducing the quality of the original image. The only parameters that are “set in stone” are the shutter speed, aperture, and ISO value used when the image was shot.

When JPEG format is used, the data file is processed immediately after the shot and before storage. While Bayer interpolation replaces missing color values with information from neighboring pixels (see page 16), the subsequent in-camera workflow includes image optimization steps like adjustment of internal sharpness and contrast, color depth reduction, and data compression (figure 224). Changing these parameters later is possible with additional steps in an image-processing program, but keep in mind that since the data is no longer original, there will be some loss of quality.

4.1.3 The Advantages of Shooting in RAW Format

The advantages of shooting RAW images begin right away during shooting, as you have don’t have to pay detailed attention to as many shooting parameters as you do when shooting JPEGs. You don’t have to set white balance at all while shooting, and you can usually apply more accurate settings during RAW conversion anyway. The fewer parameters that require your attention, the better you can concentrate on composing and framing your shot.

Perhaps the most important of all the benefits of shooting RAW is nondestructive processing. All processing steps that you perform using a RAW converter are saved separately in an additional file and can be undone or adjusted at any time, while the original image data remains intact and unaffected during the entire workflow. Should you want to, you can apply identical processing steps years later to the same digital original with no loss of image quality.

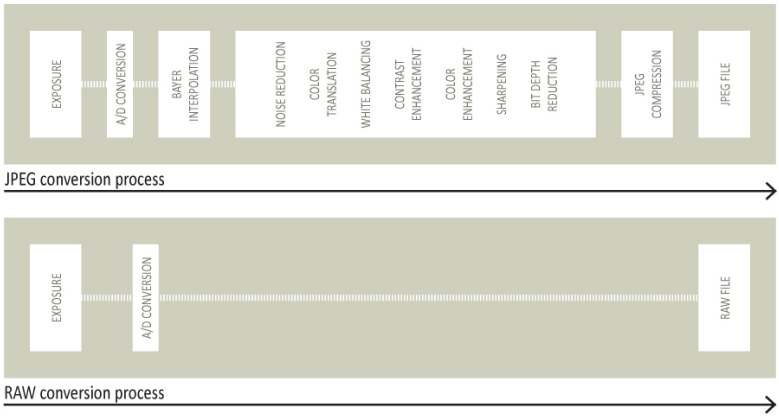


Fig. 224: The processes involved in producing JPEG and RAW digital image files

Shooting RAW ensures maximum image quality and the greatest possible processing flexibility. Today's computers and RAW converters are much more powerful than the firmware built into most cameras and are thus capable of more accurate and complex interpolation of color values. Image data conversion performed on a computer always produces higher quality results than in-camera processes (fig. 225).

RAW files contain much more raw image data than JPEG files and give you the greatest possible potential for subsequent correction of shooting errors. JPEG images have a color depth of just 8 bits per channel (bpc) and are capable of reproducing just 256 different tonal values. RAW formats offer 12 or 14 bpc data, which translates to 4,096 or 16,384 reproducible tonal values. Their reduced bit depth means that heavily processed JPEG images often contain obvious color shifts and anomalies in large areas of uniform or graded color. The much finer gradation and the presence of all of the original tonal values in a RAW image gives you more headroom for making subsequent adjustments to exposure. It is much easier to retrieve "lost" detail in under- or overexposed parts of a RAW image than it is for a JPEG.

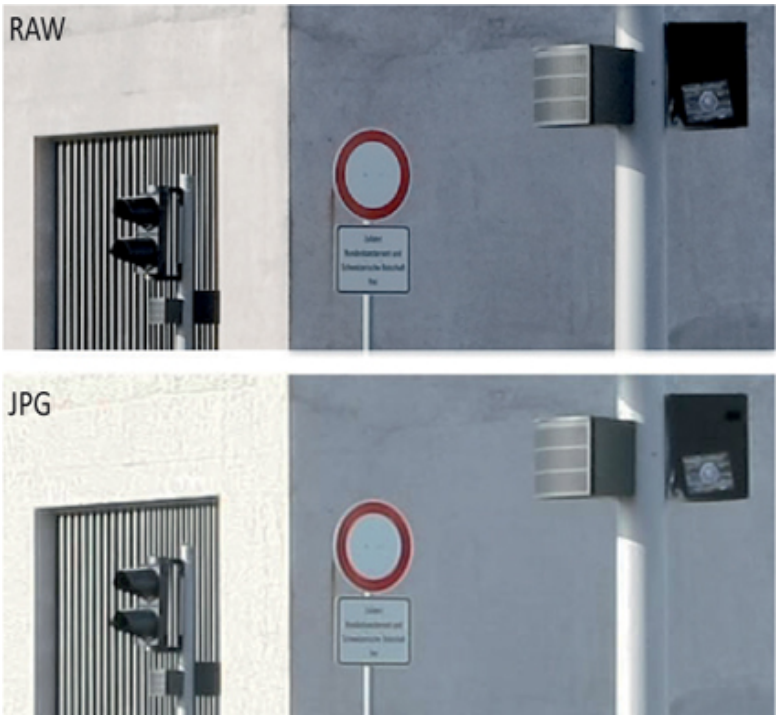


Fig. 225: A comparison of RAW and JPEG image quality

Additionally, RAW images allow complete correction of lens errors such as distortion, vignetting, or chromatic aberration, and many RAW converters have built-in tools that produce much better results than conventional JPEG or TIFF correction processes.

White balance settings adjust the colors recorded by the camera to match the color temperature of the ambient light. It can be tricky to adjust white balance accurately during a shoot without the use of a gray card, and most camera monitors don't reproduce colors reliably enough to judge color temperature accurately on-camera. The ability to adjust white balance using sliders or an eye-dropper tool in a RAW converter is an enormous help. As always, this type of adjustment is lossless and can be undone at any time.

Many cameras perform automatic noise reduction, especially if you are shooting at high ISO speeds. In almost all cases, this process causes a loss of fine image detail and often makes JPEG images look artificially smooth. Image noise is initially more obvious in uncorrected RAW images, but can be more effectively reduced using a RAW converter or third-party tools, as these are much more

closely matched to specific types of noise.

Shooting in RAW also obviates the need to specify the final image format or color space in advance of shooting. These parameters, too, can be specified during the RAW conversion process.

4.1.4 Disadvantages of Shooting in RAW Format

In addition to its many advantages, RAW also has its downside. RAW image files are much larger than JPEG files shot at the same resolution, so writing data to the memory card takes longer and you need more disk space to store your images. Processing RAW images requires a lot more computer power to produce real time image previews and fast conversions, often causing a reduction in the overall speed of your workflow. Unprocessed and unconverted RAW images are not suitable for Web publishing or other forms of distribution, and every new camera has its own individual RAW format, requiring the manufacturers of RAW processing software to update their products every time a new camera model hits the market.

4.1.5 Conclusions

If you weigh up the advantages and disadvantages of RAW, you will quickly come to the conclusion that it is a boon to architectural photography. We recommend that you use the increased image quality and processing flexibility of RAW whenever possible.

Choosing the Best Hardware for the Job

The processor (CPU), the amount of memory (RAM), and, to a degree, the type of graphics card (GPU) you use are the three factors that most influence image processing speed. The specifications of all the other components in your computer are much less important.

A fast processor with four or more cores is ideal for ensuring that things go smoothly when you are applying complex filters or other adjustments to your images. The larger your image files are, the more RAM you will require to work at speed. If your RAM is maxed out, programs like Photoshop use sections of the relatively slow hard disk to temporarily store data, which significantly slows down all image

processing tasks. Six or eight gigabytes of RAM are a sound investment for every serious digital photographer, but only if you are running a 64-bit operating system—32-bit systems can usually only handle a maximum of 4 GB. Use a fast hard disk or solid state drive (SSD) as your system disk. SSDs contain no moving parts and are much faster than conventional hard disks. We recommend that you use two large hard disks in a RAID 1 configuration for image data storage. This ensures secure storage by saving duplicate "mirror" images of all your files and allows you to continue working, even if one disk should fail.

Make sure that your computer's fans are quiet—there is nothing more annoying than constant background whir while you are working.

A high-quality monitor is essential when you are processing digital images. Flat-panel LCD models are today's norm, and have almost completely squeezed conventional CRT models out of the market. The quality of the panel built into a monitor determines its angle of view, contrast, and color reproduction characteristics. High-quality monitors are generally more expensive than mid-market models, but are definitely worth the extra cost. Wide-gamut models that are capable of displaying an extended range of colors are even more expensive and are useful if you want to process your images using not only the conventional sRGB color space but also others with broader color ranges, such as Adobe RGB.

If your image processing program has built-in color management functionality, we strongly recommend that you calibrate your monitor using dedicated software and a device called a colorimeter. This device measures the colors produced by your monitor and uses the resulting values to create a color profile that you can then use to control the way your graphics card reproduces color tones. There are also monitors available that can be directly calibrated, but these tend to be very expensive.

4.2 RAW Conversion

The following sections illustrate the steps involved in a typical RAW conversion workflow for an architectural photo. The aim of these initial steps is to produce an image that serves as a basis for a range of subsequent adjustments. We use Adobe Camera Raw (ACR), which is an integral part of both Photoshop and Photoshop

Elements and shares many similarities with Adobe's Photoshop Lightroom all-in-one workflow package.

4.2.1 A Typical RAW Processing Workflow

1. Image analysis: Our sample image shows the façades of a row of modern town houses with varying colors, textures, and material characteristics. The original photo was taken in direct sunlight on a June morning at a distance of 35 meters. We used a wide-angle tilt/shift lens to correct converging verticals during the shoot. The exposure displays no serious under- or overexposure. The RAW converter's sliders are all in their default positions and only the white balance setting saved with the image was automatically detected and loaded by the software (fig. 226).

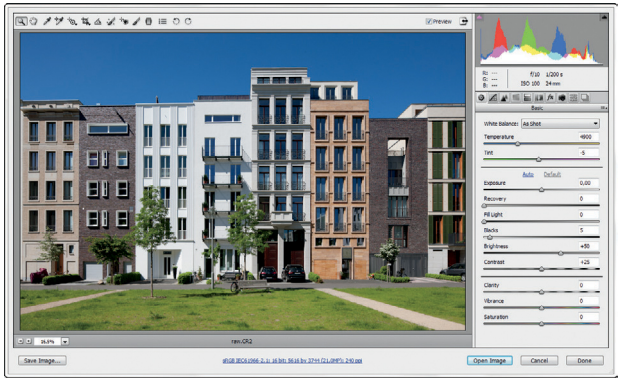


Fig. 226

2. The first step is to adjust white balance. You can do this either by manually adjusting the *Temperature* and *Tint* sliders in ACR's ***Basic*** tab (fig. 227) or by using the *White Balance tool* ❶, which can be found in the upper tool bar. You can also select from a range of presets that include *Daylight, Cloudy, Shade,* and *Auto,* although these rarely provide exactly the result you need. To perform purely manual white balance, first adjust the *Temperature* slider until you get the basic effect you are looking for and then fine-tune the results using the *Tint* slider ❷. The semi-automatic *White Balance tool* is, theoretically, most accurate, but isn't appropriate for use with all types of subjects. Simply click on your image in a

place that represents neutral gray using the eye-dropper 3, or select part of a separate photo of a gray card. The software then calculates an appropriate white balance setting based on the selected color. The marked position on the tallest building in our sample image worked very well, but not every image contains such an appropriate color. If this is the case, you will simply have find the correct setting using the sliders and trial and error. One hundred percent perfect white balance is not as important in architectural situations as it is in fashion or advertising photography, and it is often better to use a white balance setting that suits the overall mood of an image.

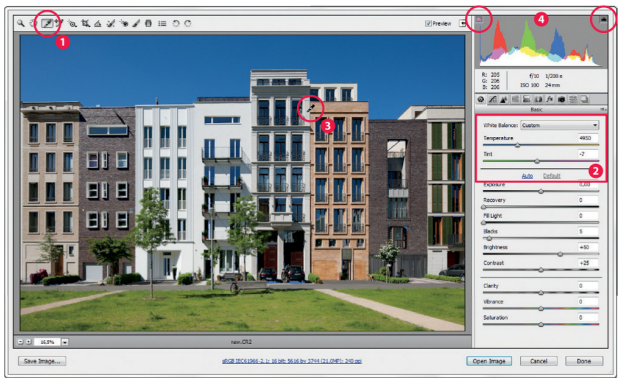


Fig. 227

3. The next step is to take a look at the ***Histogram*** located above the tool panel. This displays the distribution of tonal values within the image in graphical form and is a great aid to checking exposure (see page 120). Because all monitors display colors, highlights, and shadows differently, a histogram is the only truly reliable way to check your exposure. Our sample image has a wide range of tonal values. The triangular icons in the histogram display are *Shadow clipping warning* and *Highlight clipping warning* tools 4. When activated, these indicate the places where the image is irretrievably under- or overexposed in the preview window. Red-colored warnings indicate overexposure and blue indicates clipped shadows. The clipped areas are relatively inconspicuous in our sample image, but the shadows are nevertheless slightly more clipped than we would like.
4. The next step is to make further adjustments in the ***Basic***

panel. The *Exposure* slider initially appears to have the same effect as the *Brightness* slider, although *Exposure* is better suited to making adjustments in low-contrast images, while *Brightness* compresses the tonal values at the extreme ends of the scale without actually deleting them, and is better for dealing with high contrast. We left both settings unchanged in our example. We then used the *Fill Light* and *Blacks* sliders to adjust the slightly clipped shadows. While *Blacks* allows you to precisely determine which tonal values in the converted image appear completely black, *Fill Light* can be used to brighten dark areas without altering the tone of deep blacks (fig. 228). The *Recovery* slider is designed for retrieving details that appear to be missing in brighter image areas. But be warned: using this slider too much produces unrealistic-looking results. If the ambient light has produced too much contrast in your midtones, move the *Contrast* slider slightly to the left. This compresses the histogram curve and reduces contrast for the affected areas. If necessary, contrast can be selectively increased later on. This adjustment can also be used to increase contrast, but remember that it only affects midtones. The *Clarity* slider can be used to increase local contrast but quickly produces unwanted halos and a slightly "dirty" overall look in an image, so take care when adjusting it. Again, we left this particular setting unchanged for our sample image. The *Vibrance* and *Saturation* settings can be left alone at this stage too, and can be selectively adjusted later.

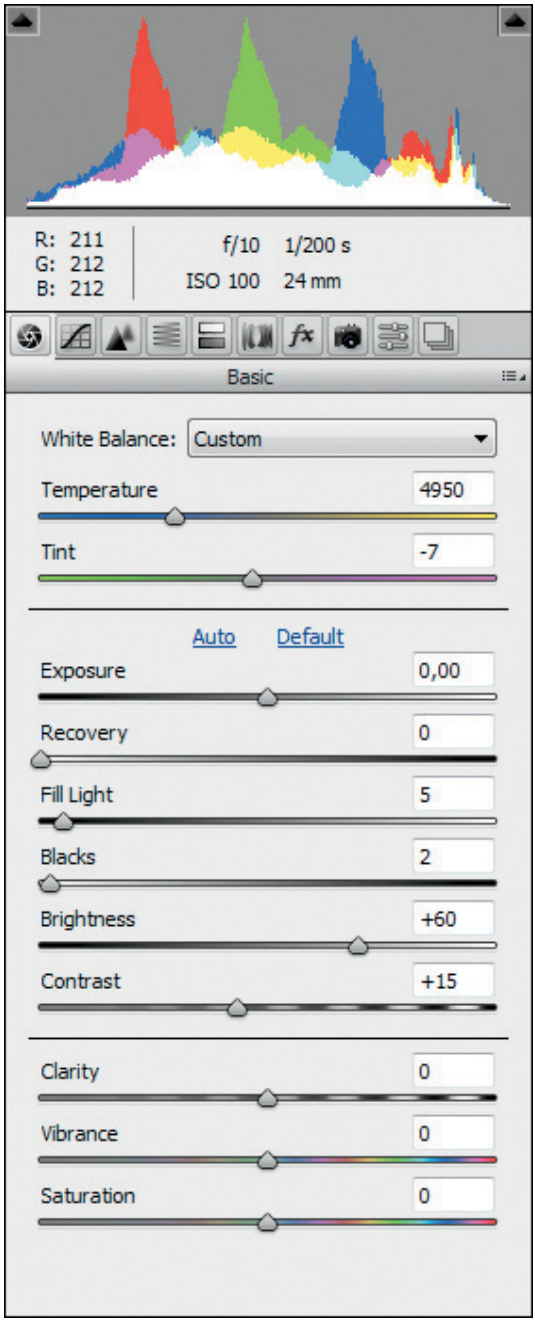


Fig. 228

5. The ***Tone Curve*** can be used to perform various fine-tuning

steps and is a tried and trusted way to make targeted tonal adjustments in selected image areas. The ACR version of the tool allows to adjust the curve either directly by manipulating control points on the curve or indirectly by adjusting the *Highlights, Lights, Darks,* and *Shadows* sliders located beneath the curve graph. These enable you to selectively brighten or darken specific tonal values. Both methods can be used to achieve the same effects and which you use is a matter of taste. Our sample image required only slight brightening in the midtones (fig. 229). In others cases, it is often a good idea to increase overall contrast or brighten darker tones using an S-shaped curve. You can also use the *Targeted Adjustment tool* located in the toolbar and the *Parametric* curve to directly brighten or darken selected image areas by dragging the cursor in the preview window. The tool's handling is simple and intuitive.

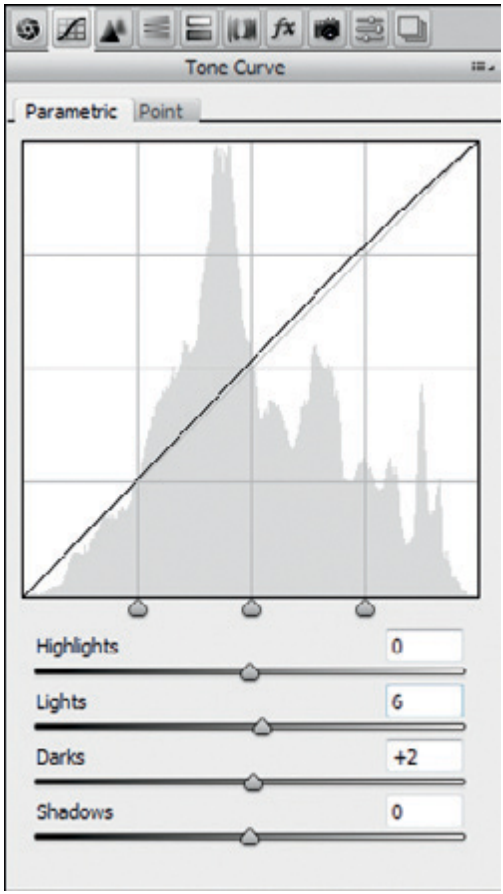


Fig. 229

Fig. 230

6. Image sharpening is generally the final step in a digital image

processing workflow, so we recommend that you apply only slight sharpening in the ***Detail*** tab. If you apply excessive sharpening too soon, you will have to deal with unwanted sharpening artifacts at a later stage. Use an *Amount* setting between *10* and *20,* a *Radius* value of *1* or less, and a *Detail* setting between *5* and *15*. The *Masking* slider can be left at its low default setting. To check image sharpness, select an image area with plenty of detail and switch to the 100% view in the preview window (fig. 230). ACR's *Noise Reduction* tool is fairly basic, and there are a number of Photoshop plug-ins available that address various specific types of noise and produce much better results. In our example, we deactivated the reduction of the slight analog-style luminance noise by selecting a *Luminance Contrast* value of 0. We only slightly reduced the blotchy color noise using the *Color* and *Color Details* sliders.

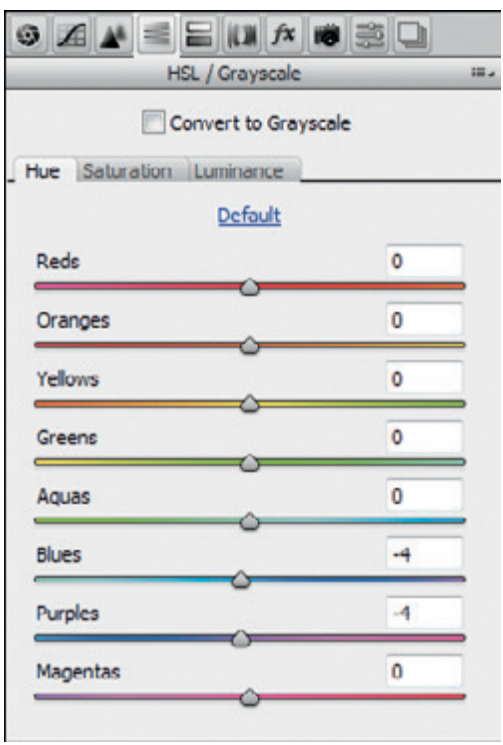


Fig. 231

7. The ***HSL/Grayscale*** tab offers a wide range of color

adjustment tools. HSL stands for *Hue/Saturation/Luminance,* and the *Hue* tab is great for making fine color corrections. We used it to correct the typical (digital) red cast in the sky (fig. 231). The *Saturation* tab is used to make adjustments to color intensity, and we used it to strengthen the color of the sky (fig. 232). Theoretically, you can use the tool to desaturate complete image areas and increase saturation in others—effects that can produce quite surreal-looking images. However, we only usually use it to make corrections that arise from other correction processes: While manually brightened shadows or darkened highlights automatically appear well saturated, shadow areas that have been further darkened or highlights that have been brightened tend to look somewhat desaturated. The *Luminance* tab is used to regulate the brightness of individual colors, and we used it to darken the blues (to further intensify the color of the sky) and to slightly brighten the red and yellow tones (fig. 233). If you want to convert an image to black-and-white, check the *Convert to Grayscale* box. The three HSL tabs will then be displayed in a single tab called *Grayscale Mix* in which you can adjust the intensity of the various grayscale tones. These allow you to produce monochrome images with widely differing looks. Here too, the same adjustments can be made using the *Targeted Adjustment tool.*

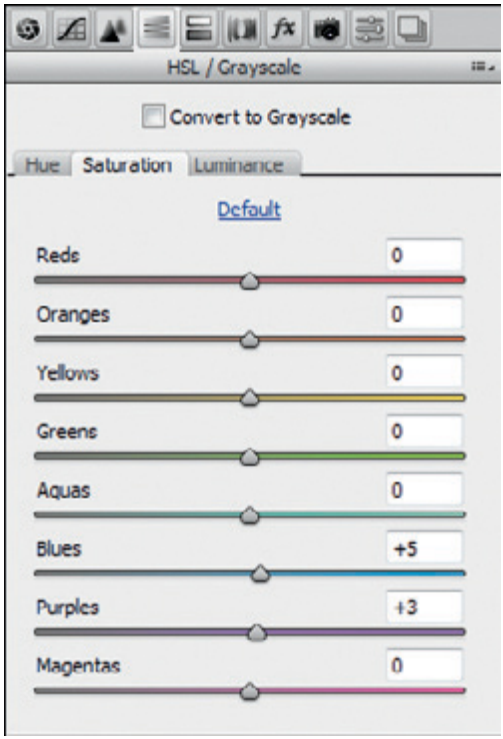


Fig. 232

8. The ***Split Toning*** tab enables you to make separate adjustments to highlight and shadow areas. This can be useful, for example, if the shadow areas in an image contain color casts but the rest of the images requires no correction. This tool can also be used to give an image a warmer or cooler overall look, as we did with our sample image (fig. 234), or used for tinting images that you have already converted to grayscale.

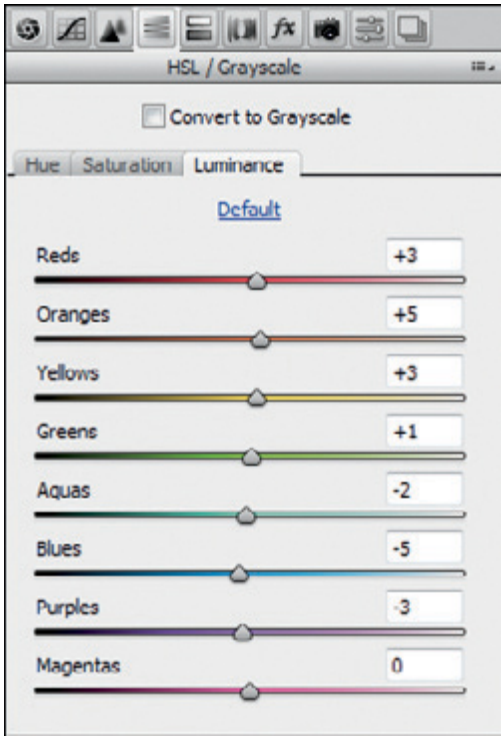


Fig. 233

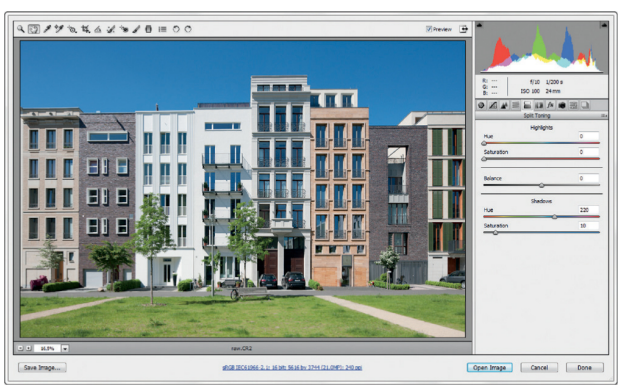


Fig. 234

9. The ***Lens Corrections*** tab contains tools that are very important for architectural photographers. The tool's *Profile* tab contains sliders for correcting distortion, vignetting, and chromatic aberration, as well as the selection parameters for a wide range of lenses for which specific errors can be

corrected automatically (fig. 235). If your particular lens hasn't yet been profiled by Adobe, you can use the free Adobe Lens Profile Creator software to create your own profile. Tilt/shift lenses cannot be easily profiled because the nature of the errors they produce changes according to the settings you have selected. The *Correction Amount* slider reduces or increases the strength of each individual adjustment. The tool's *Manual* tab enables you to adjust lens errors manually and includes *Vertical, Horizontal, Rotate,* and *Scale* sliders for adjusting perspective errors, although it is easier to make fine adjustments to perspective later using Photoshop's own tools. Chromatic aberrations appear mostly in the form of red or cyan-colored fringes, although some lenses produce blue and yellow fringes, too. These can usually be completely eliminated (fig. 236). There are no hard and fast rules for correcting chromatic aberrations, but they are easiest to check if you use a 100% or 200% preview 1 and navigate to a high-contrast image detail in the corner of the image that contains obvious fringing. You can then move the *Fix Blue/Yellow Fringe* slider 2 until the fringes take on red/cyan coloring. You can then eliminate these using the *Fix Red/Cyan Fringe* slider. The *All Edges* Option in the *Defringe* drop-down menu is great for completely eliminating chromatic aberrations. If you save your lens-specific settings as a preset in the ***Presets*** tab, you can recall them and apply them to other images with a single click (fig. 237). The chromatic aberrations produced by zoom lenses, vary according to focal length, which means that the settings required to eliminate fringing also vary. It only makes sense to save settings as a preset for a zoom lens if you regularly work using exactly the same focal length setting. The large image circle projected by our lens and the medium shift and aperture settings we used caused only slight vignetting, requiring only a slight change to the *Amount* setting in the *Vignetting* panel 3 (fig. 236). The vignetting caused by regular lenses and other aperture settings usually requires stronger correction, making it necessary to readjust the *Amount* and *Midpoint* settings according to the lens used to take each shot.

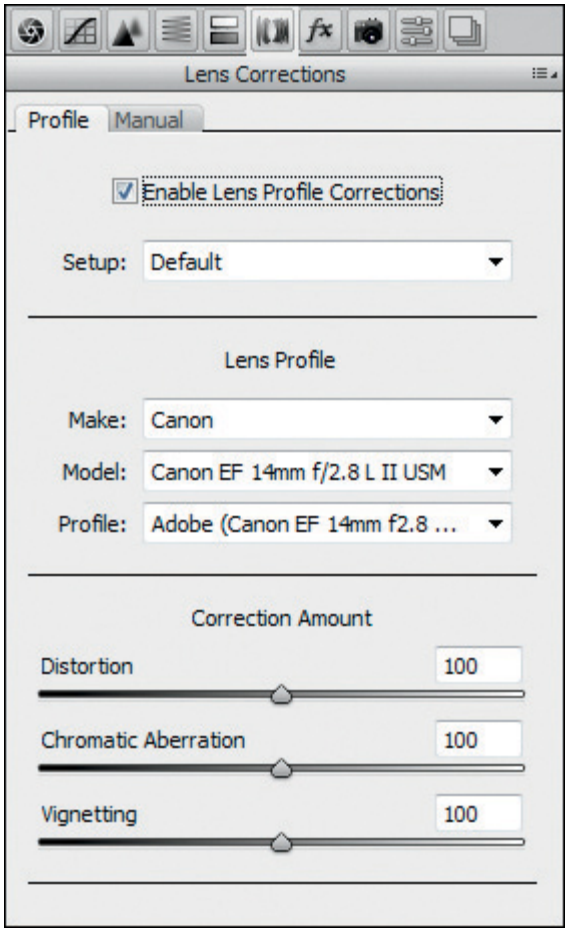


Fig. 235

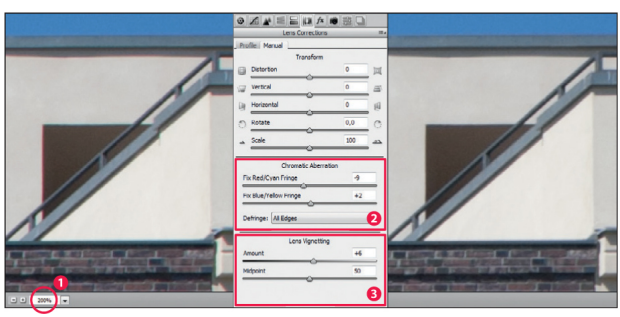


Fig. 236

10. The ***Effects*** tab includes options for adding analog-style *Grain* or vignette effects to images that have already been cropped

(Post Crop Vignetting). We used neither of these effects in our example.

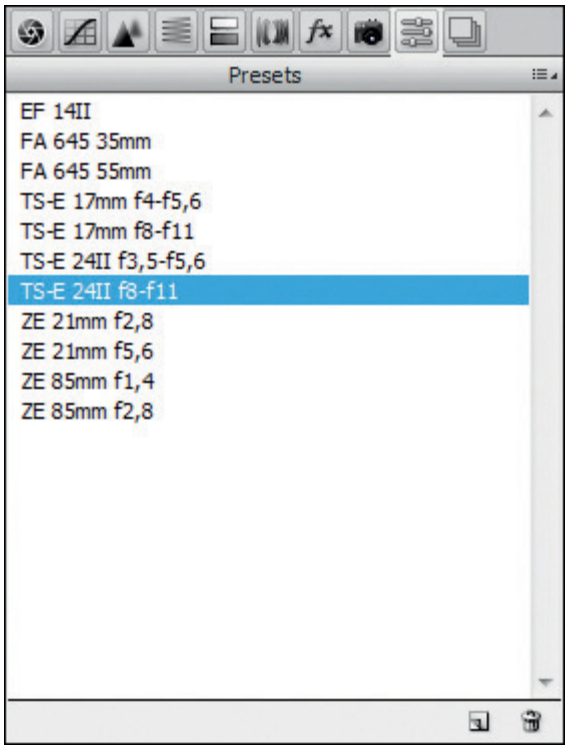


Fig. 237

11. The ***Camera Calibration*** tab allows you to select and adjust custom camera profiles, for example to permanently counteract a known color cast produced by a particular camera. The ***Snapshots*** tab enables you to take "snapshots" of various versions of your image for recall and comparison during current or future processing sessions (fig. 238).

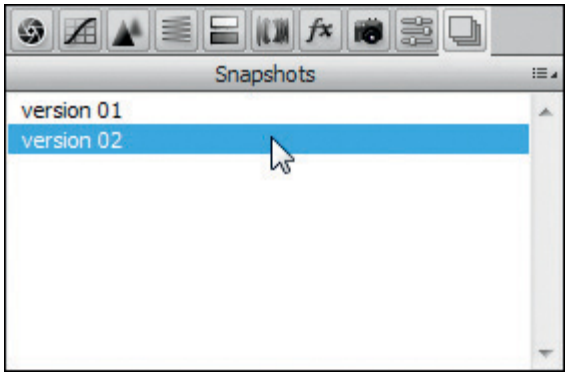


Fig. 238

12. Other ACR tools (fig. 239) include the *Crop* tool ❶ and the extremely useful *Straighten* tool ❷, which perfectly aligns your image to a horizontal or vertical line that you drag across the preview image. If you want to correct distortion later in your workflow, don't use either of these tools at this stage, as they can only be applied to the entire image. The *Spot Removal* tool ❸ is intuitive to use and is great for removing flaws caused by dust spots on the image sensor. The *Adjustment Brush* tool ❹ is used for making selective tonal value corrections (fig. 240), and the *Graduated Filter* tool ❺ applies highly variable gradients to digital images.

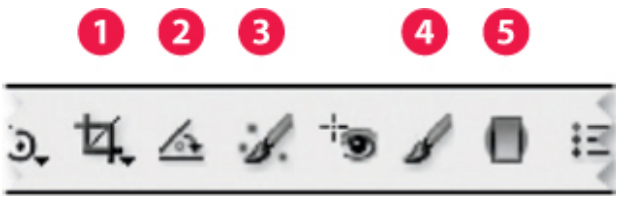


Fig. 239

13. Before clicking the *Open Image* button to start the conversion, click on the blue underlined image data at the bottom edge of the ACR preview window to perform a final check of your ***Workflow Options*** (fig. 241). Here, you can select a color space—*sRGB IEC61966-2.1* is usually the best choice for images you want to display on the Web or have printed by a lab, while the larger Adobe RGB color space is better for pre-press work or if you are using an output device such as an extended-gamut monitor or a high-end inkjet printer that

supports *Adobe RGB (1998)*. Select the *16 Bits/Channel Depth* setting to ensure that your image retains the maximum possible range of color data. This does, however, require additional computing power, so select the *8 Bits/Channel* option if you are using an older computer. Leave the *Size* setting at its default value unless you are using a large-format printer or some other special application. In this case, you will achieve better results if you reinterpolate the image now, as long as the program still has access to the raw image data. You can select any *Resolution* setting, as this doesn't affect absolute resolution and only determines the size at which the image can be reproduced using a specific pixel density. If you want to perform pre-output sharpening, the *Sharpen For* setting includes options for *Screen, Glossy Paper,* or *Matte Paper* in *Low, Standard,* and *High* amounts.

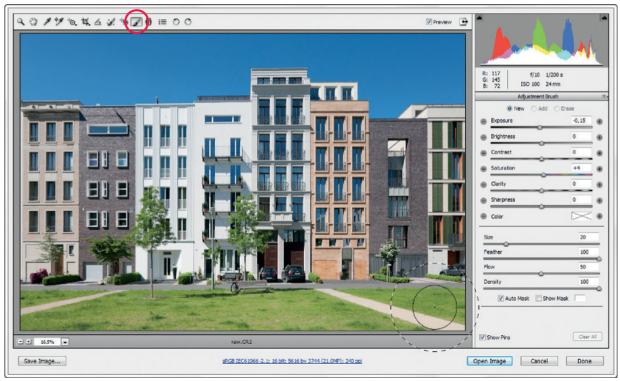


Fig. 240

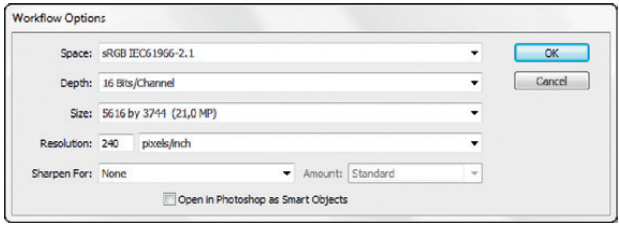


Fig. 241

Adobe Camera Raw Conversion Workflow Overview

- *Set white balance (individually according to the image being*

processed)

- *General image optimization (overall exposure, contrast, highlights and shadows) using the histogram*
- *Fine-tuning using the Curves tool*
- *Perform moderate basic sharpening*
- *Optional: Select HSL/Grayscale settings*
- *Remove/add color casts as desired using Split Toning*
- *Perform lens corrections and perspective correction as necessary*
- *Add Grain/Post Crop Vignetting effects as desired*
- *Perform final touches: Remove dust spots, crop/straighten, perform selective corrections as desired*
- *Check Workflow Options*
- *Convert image*

Exif Data

The Exif (Exchangeable Image File) data format was formulated in 1998 and is used by virtually all digital camera manufacturers to record ancillary image data tags. These tags are written to an image file's so-called "header", and are directly embedded in JPEG and TIFF image data. Exif data fields include shutter speed, aperture, date, time, focal length, ISO value, flash settings, white balance, and many others. This information can help you to discern why an image is particularly effective or why it didn't turn out as you expected.

Many image processing programs can access Exif data directly and can use it to sort and analyze individual or multiple images.

EXIF	
Dimensions	5616 x 3744
Cropped	5616 x 3744
Exposure	1/200 sec at *f* / 10
Exposure Bias	2/3 EV
Flash	Did not fire
Exposure Program	Aperture priority
Metering Mode	Pattern
ISO Speed Rating	ISO 200
Focal Length	14 mm
Lens	EF14mm f/2.8L II USM
Date Time Original	26.04.2008 19:37:19
Date Time Digitized	26.04.2008 19:37:19
Date Time	26.04.2008 19:37:19
Make	Canon
Model	Canon EOS-1Ds Mark III

Detail of the Exif data associated with a RAW image file

4.3 Post-processing

4.3.1 Image Adjustments

Once you have converted a RAW image, your image data is in the best possible state for making individual corrections and adjustments. The following sections describe a typical image correction workflow. The steps we describe and the order we perform them in are by no means mandatory, and everyone sooner or later develops their own personal working style. However, some steps are better performed before others if you want to produce consistently good results. If you are just starting out, the following workflow provides a great set of basic guidelines.

Workflow: Image Adjustments

1. We have now converted our sample image to 16 bpc (bits per color channel) color depth, adjusted its white balance, performed a couple of minor corrections to tonal values, and

reduced the amount of visible chromatic aberrations and vignetting (fig. 242).

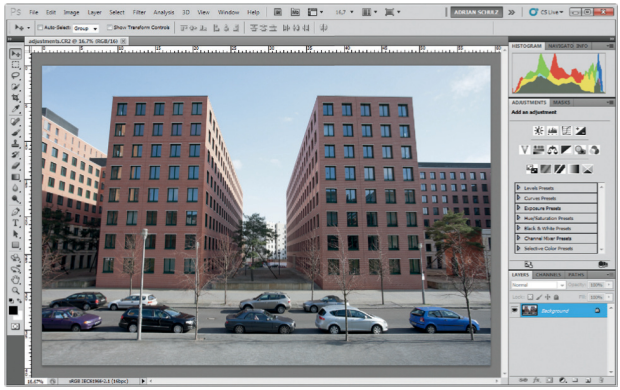


Fig. 242

2. Changes to framing or a correction of converging verticals should be done at the same time as or after the correction of lens-induced distortions, never before. Distortion correction is only precise if the entire image is processed.

   Correcting perspective and distortion in Photoshop: If you haven't already corrected distortion using Adobe Camera Raw, the Photoshop *Filter* > *Lens Correction* tool is perfect for making automatic and manual corrections to perspective and lens errors. In order to perform automatic corrections, the *Auto Correction* tool requires Exif camera and lens data and the presence of an appropriate lens profile. All you then have to do is check the *Geometric Distortion* option and Photoshop will calculate the appropriate correction values and apply them to your image (fig. 243). You can also select the *Auto Scale Image* option if desired. Manual distortion correction can be performed using the *Remove Distortion* slider in the *Custom* tab (fig. 244). For our sample image, we moved the slider slightly to the right to correct the barrel distortion that is typical in images shot using wide-angle lenses ❶. The ideal correction values depend on the lens you are using and its focal length. These two types of correction influence each other reciprocally, so it easier to find the best settings if you perform perspective correction at this stage, too. On the one hand, distorted lines are more obvious if perspective has already been corrected while on the other hand, it is easier to

align straight lines to a perspective grid if they have already been straightened. We used the *Vertical Perspective* slider in the *Transform* panel ❷ to correct the converging lines on our sample image. The *Horizontal Perspective* slider is great for correcting errors that occur if the film/sensor plane wasn't parallel to the building's façade during shooting. The *Straighten* tool ❸ functions in exactly the same way as the ACR version described in the previous section, and we used it to correct the very slight rotation in our sample image. All perspective and distortion errors have now been corrected. Click *OK* to confirm them and return to the main program window.

Using plug-ins to correct distortion and perspective errors: There are also various third-party tools available for correcting distortion and perspective errors, such as PTLens (for PCs and Mac) and LensFix (for Mac only). These tools correct errors based on a comprehensive database of the anomalies produced by a wide range of camera/lens combinations, and are even capable of automatically correcting wave distortion. Here too, the software uses Exif data to determine the appropriate correction parameters. We used the plug-in version of PTLens to correct our sample image. Once installed, the plug-in can be found under *Filter* > *ePaperPress* > *PTLens*. Now go to the *Barrel-Pincushion* panel in the plug-in window (fig. 245). The software usually detects the correct camera and lens models immediately, but some combinations require manual input. If the *Preview* box is checked and the *Barrel-Pincushion* option is selected in the *Correct* panel, the correction values stored in the database will be applied to the image in the preview window in real time. The *Perspective* tab includes intuitive tools for correcting converging lines, and activating the built-in grid makes aligning your image much easier. You can also shift the entire image up, down, or to the side using the four-way button in the same tab. It is preferable to correct vignetting and chromatic aberrations during RAW conversion, but if you haven't already done so, PTLens includes appropriate tools. Click *OK* to apply your selected settings and return to the main Photoshop window.

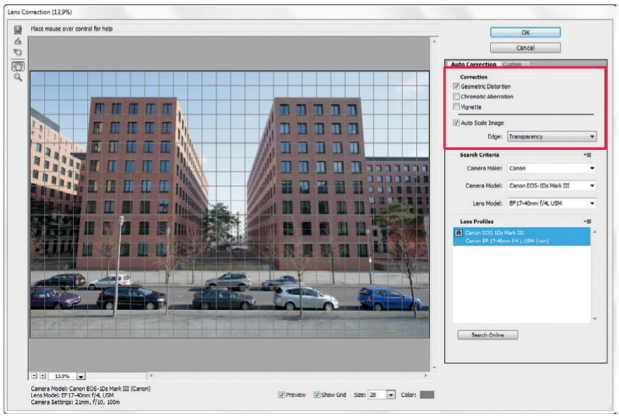


Fig. 243

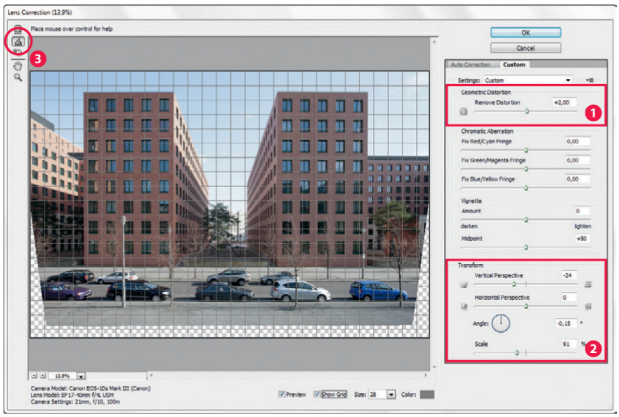


Fig. 244

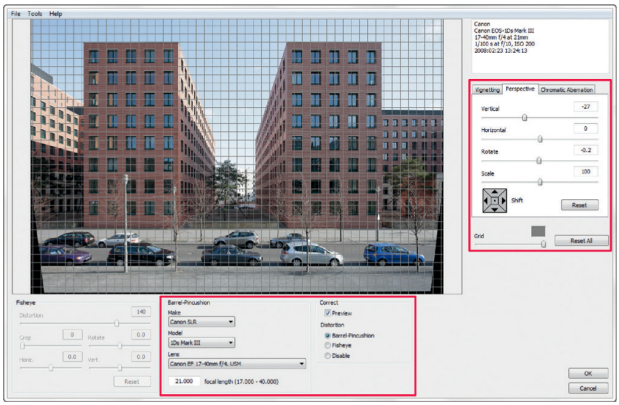


Fig. 245

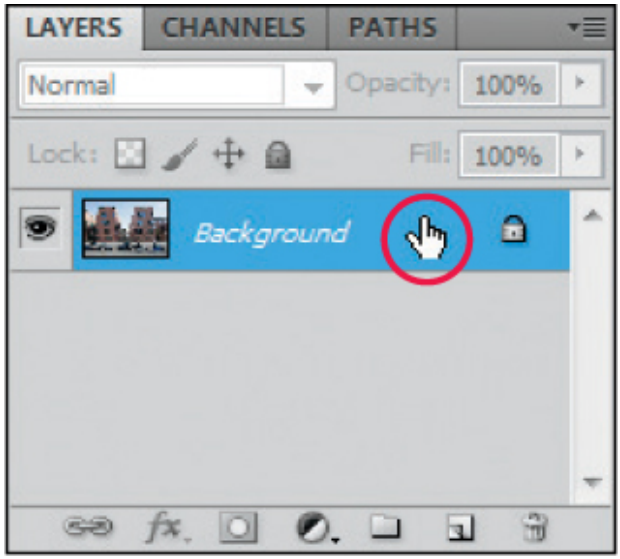


Fig. 246

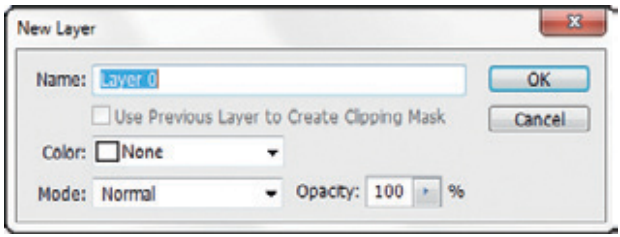


Fig. 247

Correcting perspective using the Transform command: You can also correct perspective in images that require no further distortion correction using the Photoshop *Edit* > *Transform* command. Either drag Guides across your image or show the grid using the commands in the *View* > *Show* menu. Convert the background layer into a transformable layer by double clicking its thumbnail in the Layers menu (fig. 246) and then clicking *OK* in the following dialog (fig. 247). The background layer will now be called *Layer 0*. Now use the *Edit* > *Transform* > *Perspective* or *Distort* commands to distort your image to suit your purposes (fig. 248). If you move the upper corners apart during the transformation, it is important to move the lower corners closer together in order to prevent the finished image from appearing vertically compressed.

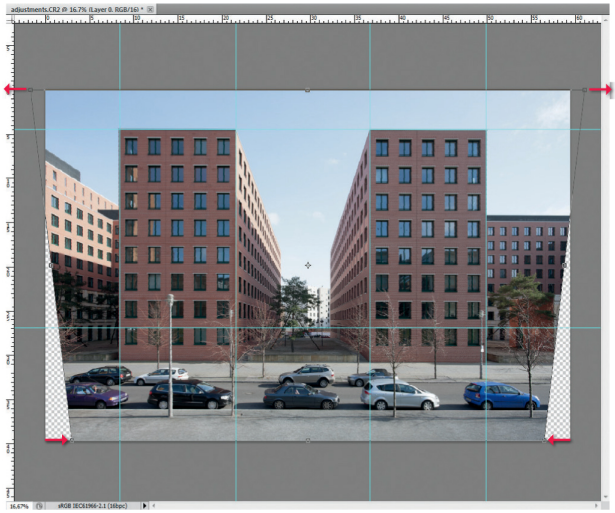


Fig. 248

Cropping your image: The next logical step is to crop your adjusted image. Drag a marquee around the appropriate area using the *Crop* tool and confirm your selection with a double click (fig. 249). In our example, we preserved the greatest possible image area, which actually altered the aspect ratio. If you want to use a specific aspect ratio, use the *Rectangular Marquee* tool to make your selection, select the *Style* > *Fixed Ratio* option in the toolbar and enter your desired values in the boxes. You can then drag a marquee and make your selection using the *Image* > *Crop* command. If your selection extends beyond the edge of the image in places where image detail is uniform, you can use the *Polygon Lasso* tool to select the excess image space and use the *Edit* > *Fill...* command with the *Use* > *Content-Aware* option activated to fill the blank space. The quality of the results will depend on the type of detail you are attempting to duplicate. Alternative ways to round out an image are to use the *Clone Stamp* tool or by simply making a tighter crop.

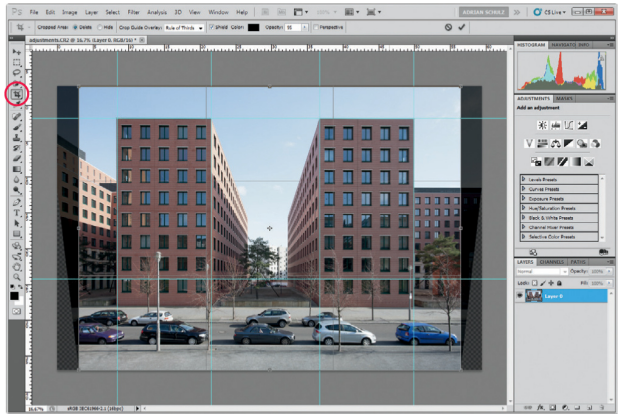


Fig. 249

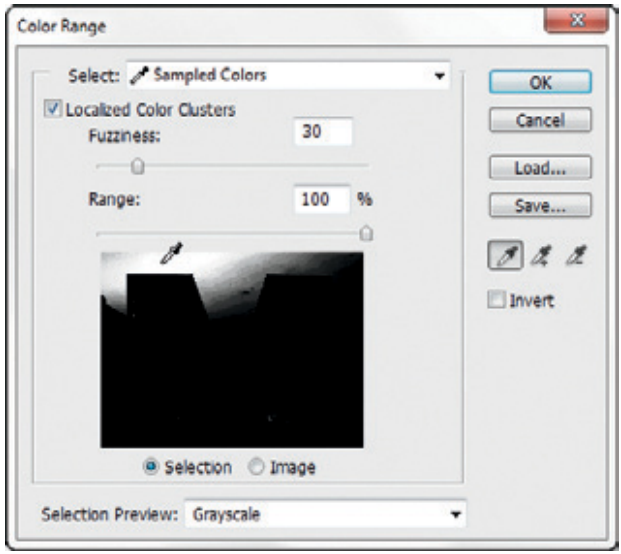


Fig. 250

3. The following section describes various ways of making corrections to image brightness. **Selective darkening:** We decided to first darken the sky in our sample image. If the division between the building and the sky is clearly defined, you can use the *Magic Wand* tool with the Shift key pressed to make multiple selections. If the area you wish to select contains complex shapes, such as a tree, it is probably better to use a different method. Selecting the *Select > Color Range* command opens a dialog in which you can precisely

determine which colors to select. Choose the *Select > Sampled Colors* option, activate the *Localized Color Clusters* option, and click on the sky in the preview window. The selected areas are then marked in white and non-selected areas in black (fig. 250). The *Add to Sample* eyedropper can then be used to add all other tones in the sky to your sample. Leave the *Fuzziness* slider near the left-hand end of the scale, but check to see if slight movements up or down produce better results for your particular image. The same is true for the *Range* slider, although you will probably need to use higher base values than for *Fuzziness* (fig. 251). The aim of the exercise is to create a clear transition between the sky and the other elements in the picture. Click *OK* to view your selection in the main preview window. You will notice that this technique also selects other areas with tones similar to those in the sky. To remove these from your selection use the *Polygon Lasso* tool in *Subtract From Selection* mode (fig. 252) to select all areas that aren't part of the sky. Any minor inconsistencies can be corrected later using the layer mask that this step creates. You can now optimize your selection using the *Refine Edge* dialog, which you can open either by clicking the button in the toolbar or via the *Select > Refine Edge...* command (fig. 253). Activate the *Smart Radius* option in the *Edge Detection* section and set the other options according to the nature of your image. Trial and error or using previously successful values are the best ways to find the ideal *Radius* setting. We find that values between *0* and *5* are generally the most effective, and that using the *Zoom* tool helps us to accurately judge the results. Using *Radius* values that are too high for finely textured or partially translucent objects such as trees produces inaccurate selections. Leave the *Smooth* and *Contrast* sliders either at the left of the scale or set to *0* and select a *Feather* value below 1. Use a *Shift Edge* value between *+5 %* and *+10 %* to prevent fringing at the edges of your selection. This enlarges your selection to a minimal degree (fig. 254). Click *OK* to return to the main program window. Leave your selection active and select the *Curves* menu either directly from the *Adjustments* panel (fig. 255) or by using the *Layer > New Adjustment Layer > Curves ...* command. Regardless of the method, your selection will no longer be active, and the

program creates a new adjustment layer and layer mask called *Curves 1* (fig. 256). A layer mask is a grayscale image used to determine the opacity of the layer it is associated with. Black areas are reproduced fully transparent and white areas are completely opaque. Layer masks can thus be used to show or hide specific areas within an image without actually deleting any pixels. When you are fine-tuning an image, hidden image areas can be easily shown by painting in the layer mask using a white brush. To do this, simply click on the layer mask with the Alt key pressed ❶ and paint into the resulting black-and-white image. Before we adjusted the layer mask, we darkened the sky in our sample image by dragging the curve downward ❷. Thanks to the layer mask, all adjustments are only applied to the currently active selection.

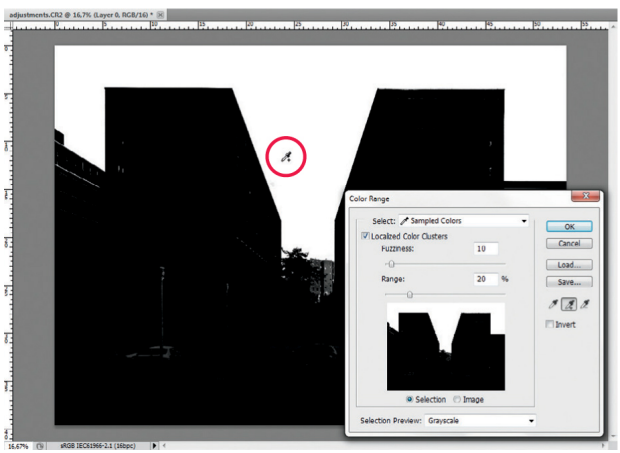


Fig. 251

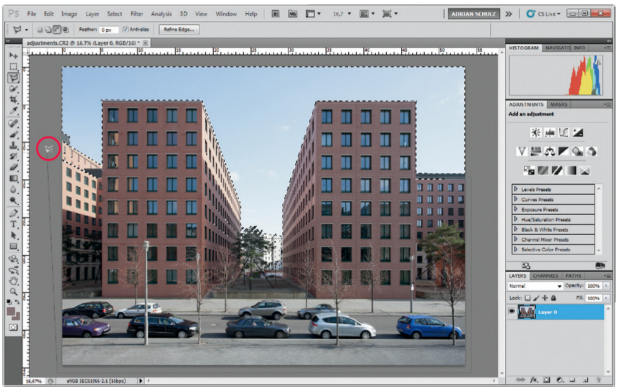


Fig. 252

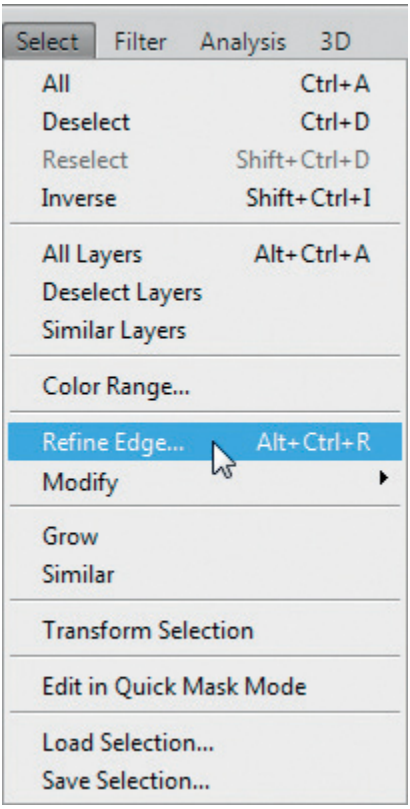


Fig. 253

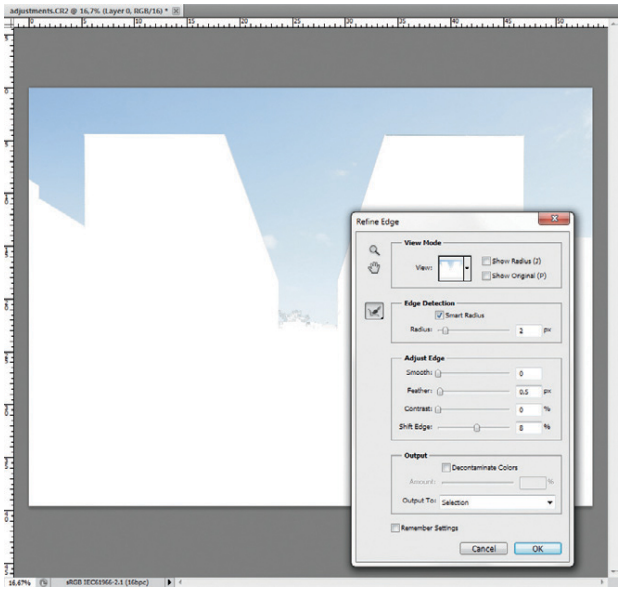

adjustments.CR2 @ 16.7% (Layer 0, RGB/16) *
Refine Edge
View Mode
View:
Show Radius (J)
Show Original (P)
Edge Detection
Smart Radius
Radius:
2
px
Adjust Edge
Smooth:
0
Feather:
0.5
px
Contrast:
0
%
Shift Edge:
0
%
Output
Decontaminate Colors
Amount:
%
Output To:
Selection
Remember Settings
Cancel
OK
16.67%
sRGB IEC61966-2.1 (16bpc)

Fig. 254

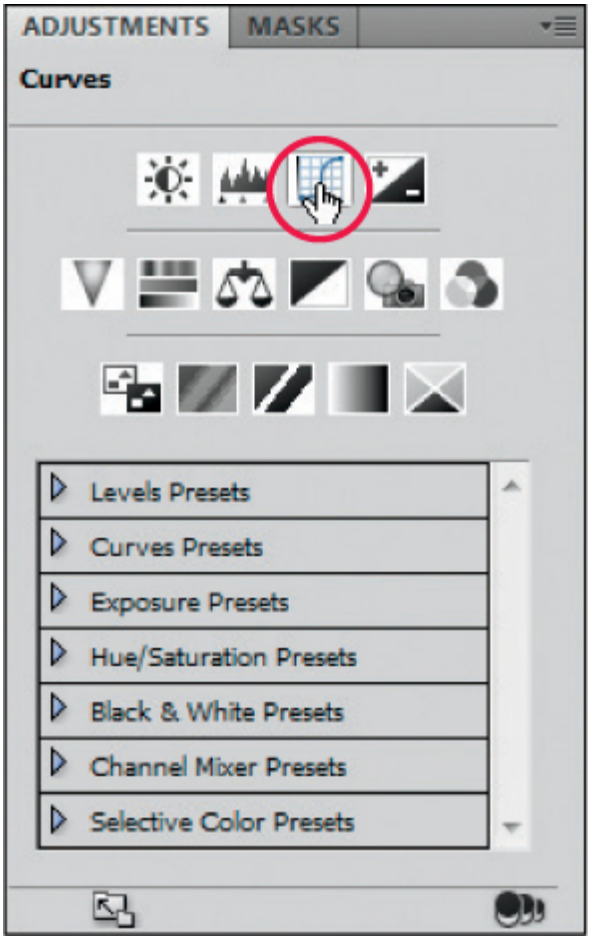

ADJUSTMENTS
MASKS
Curves
Levels Presets
Curves Presets
Exposure Presets
Hue/Saturation Presets
Black & White Presets
Channel Mixer Presets
Selective Color Presets

Fig. 255

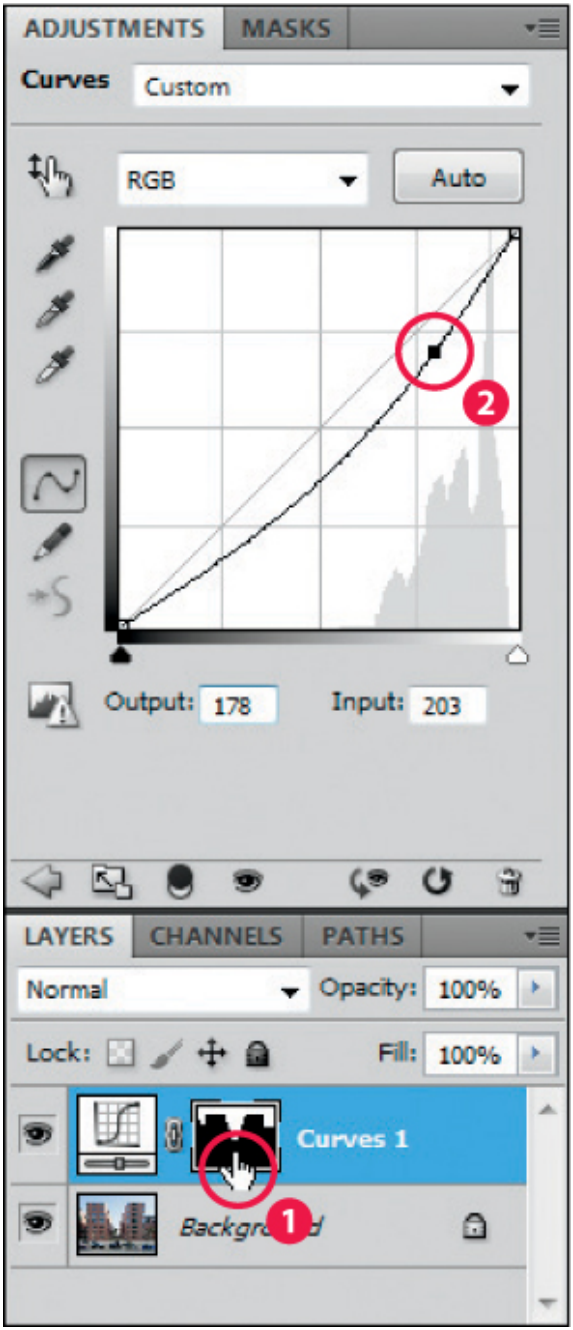

ADJUSTMENTS
MASKS
Curves
Custom
RGB
Auto
2
Output: 178
Input: 203
LAYERS
CHANNELS
PATHS
Normal
Opacity: 100%
Lock:
Fill: 100%
Curves 1
1

Fig. 256

4. **Selective brightening:** The next step involves adding another adjustment layer. Once again, select the *Curves* dialog in the *Adjustments* panel, this time with no active selection. To keep track of your work, we recommend that you name each layer individually when you are working with multiple layers. We will now use our newly named *Brighten* layer to selectively brighten parts of our sample image (fig. 257). Theoretically, we could once again select the *Color Range ...* command, select the *Shadows* instead of the sky and simply blur the layer mask. However, we would like to demonstrate an alternative method: Activate the *Brighten* layer by clicking on its thumbnail and slightly brighten the entire image using the *Curves* or *Levels* dialog. Now activate the layer mask and fill it with black (fig. 258) using either the *Edit* > *Fill...* or the *Image* > *Adjustments* > *Invert* (Ctrl-I/Cmd-I) command. The adjustments you have just made will disappear. Now select a large, soft brush using the *Brush* tool (fig. 259) ❶, set the foreground color to white, and reduce opacity to a low value (30% in our example) ❷. Use the brush to paint areas that are too dark in the active black layer mask ❸. This once again makes the areas we previously brightened visible. Alternative methods for brightening and darkening specific image areas are described in section 4.3.2.
5. Now that we have completed our major adjustments to brightness, the next step is to reduce **noise** for images that have been strongly brightened or that were shot using high ISO values. Photoshop includes the *Filter* > *Noise* > *Reduce Noise...* command for doing just that (fig. 260). Our sample image doesn't require any noise reduction, but if you do decide to reduce noise, take care to apply the filter you use in moderation, as noise reduction always reduces the quality of fine details. Generally, a slightly noisy image looks better than one in which detail has been softened too much. In addition to the standard Photoshop tool, there are a number of effective noise reduction plug-ins available, including Noiseware, Neat Image, Topaz DeNoise, or Noise Ninja, all of which can be worth spending a little extra money.

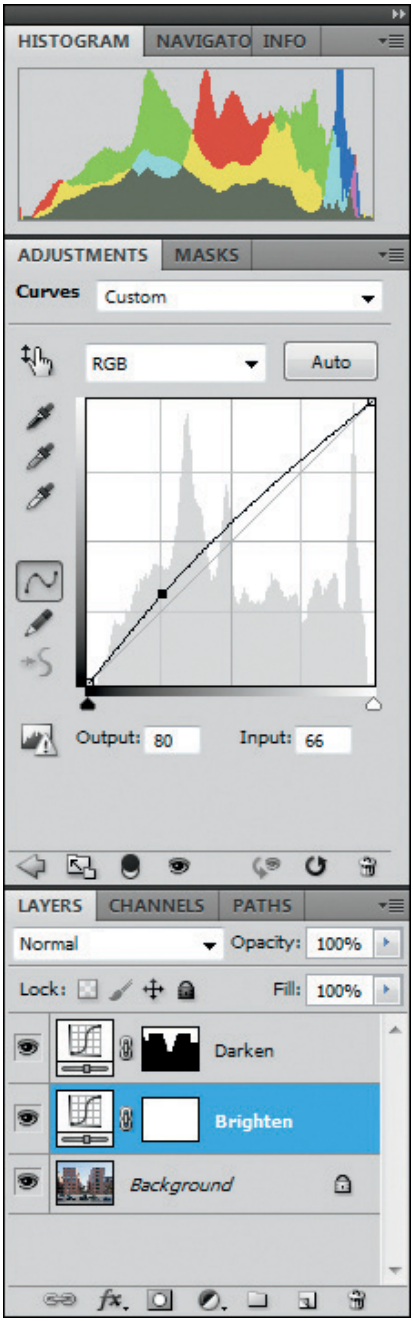

HISTOGRAM
NAVIGATO
INFO
ADJUSTMENTS
MASKS
Curves
Custom
RGB
Auto
Output: 80
Input: 66
LAYERS
CHANNELS
PATHS
Normal
Opacity: 100%
Lock:
Fill: 100%
Darken
Brighten
Background

Fig. 257

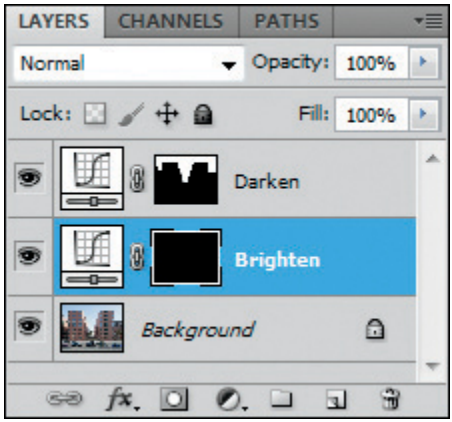


Fig. 258

6. We can now perform any additional **color corrections** that we didn't make at the RAW conversion stage. The *Selective Color* dialog in the *Adjustments* panel (also reachable via *Layer > New Adjustment Layer > Selective Color...)* is great for performing targeted adjustments (fig. 261). The adjustments you can make vary enormously and depend entirely on the subject and the type of image you want to produce, so experience and experimentation are once again the best yardsticks for finding the right settings. We decided to give our sample image a slightly cooler look using a new layer *(Layer > New > Layer...)* in *Hue* mode (fig. 262). We then used a blue tone with reduced opacity to fill the layer (fig. 263). The result is an overall slight blue tone that can be selectively applied or reduced using a layer mask. An alternative way to produce the same effect is using the *Photo Filter* dialog in the *Adjustments* panel (also reachable via *Layer > New Adjustment Layer > Photo Filter ...*), which can also be selectively applied or undone at any stage (fig. 264).

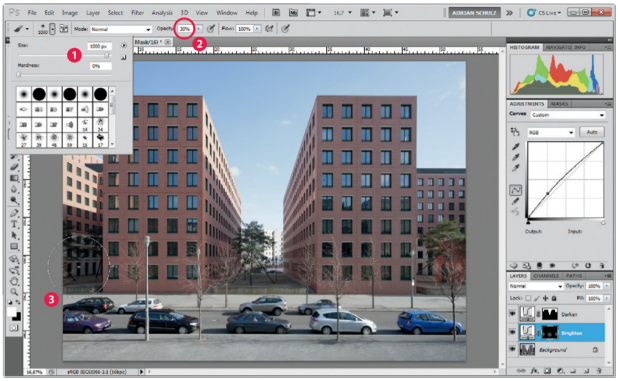


Fig. 259

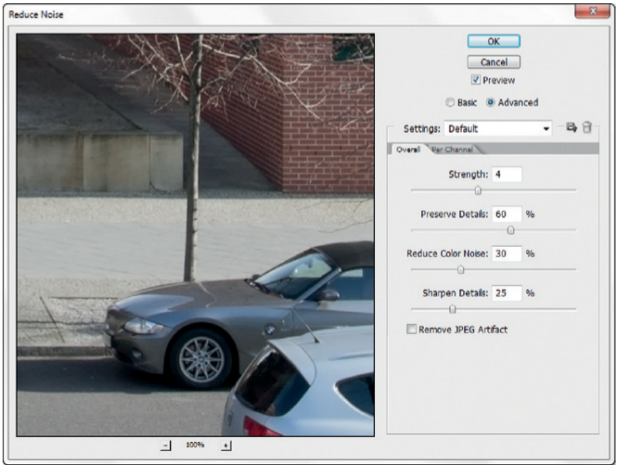


Fig. 260

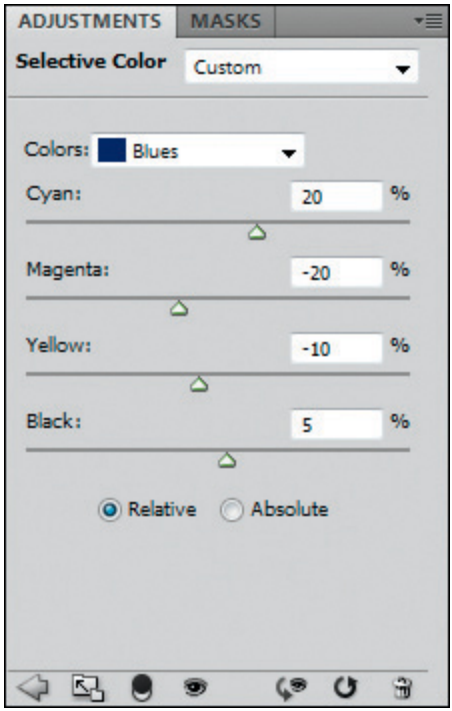


Fig. 261

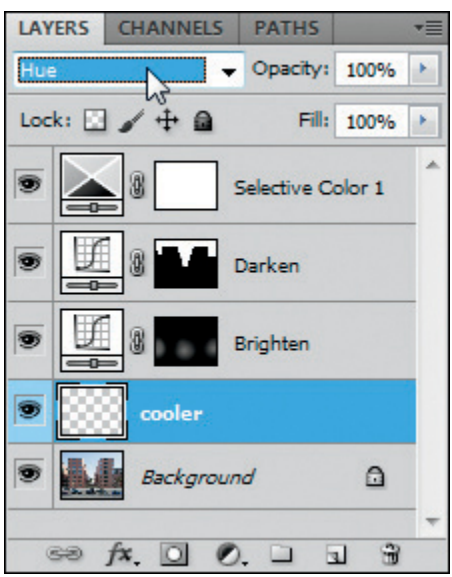


Fig. 262

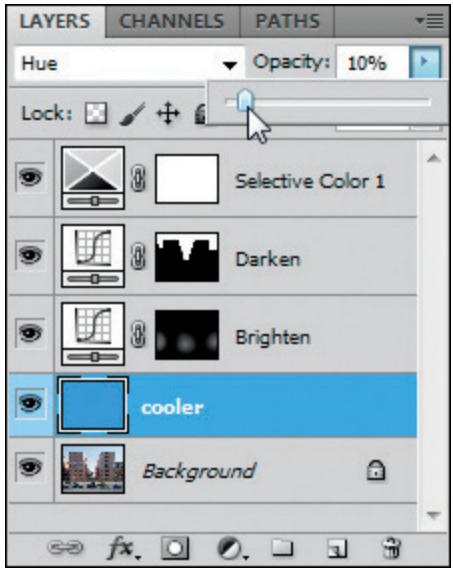


Fig. 263

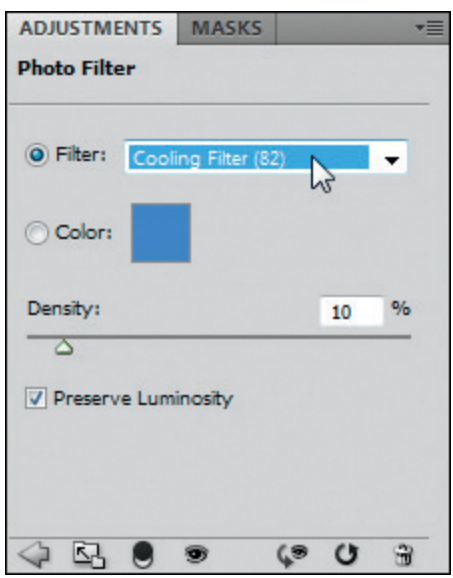


Fig. 264

7. **Saturation** can be increased or reduced in a similar way using the *Vibrance* dialog (also found in the *Adjustments* panel, fig. 265). The *Vibrance* slider adjusts saturation for less saturated colors to a greater degree than for colors that are

already well saturated. The *Saturation* slider adjusts saturation irrespective of a color's current level of saturation.

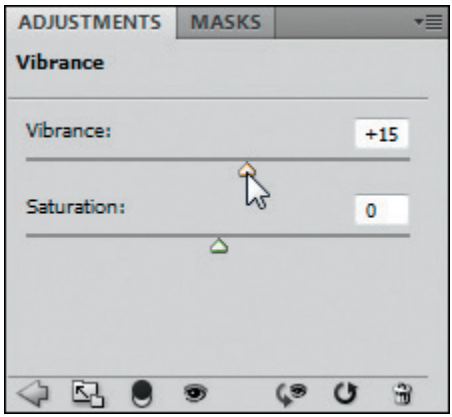


Fig. 265

8. We recommend that you use a slight S-curve created using the *Curves* dialog or the *Image > Auto Contrast* command to "stretch" the histogram for low-contrast images. This makes the darkest areas black and the brightest areas white. Our sample image already covers a very broad tonal range, so we only had to slightly increase **local contrast.** To do this, duplicate the background layer *(Layer > Duplicate Layer...)* and use the *Filter > Sharpen > Unsharp Mask...* command with a high *Radius* value to increase edge and overall contrast. Set the *Amount* value to suit the image you are working on (fig. 266). The disadvantage of this technique is that it can produce unwanted "halo" effects at high-contrast edges (fig. 267), although these, too, can be removed using a layer mask and a black brush (fig. 268). Alternatively, you can load the selection already created for the *Darken* layer by holding down the Ctrl/Cmd key and clicking on the layer mask thumbnail (fig. 269). You can then apply it to the active layer mask on the *Local Contrast* layer *(Edit > Fill > Black)*. After application, reduce the layer's opacity to keep the effect subtle (fig. 270), as over-the-top effects quickly spoil the overall look of an image. Once you are done with these steps you can flatten your image to a single layer *(Layer > Flatten Image)*.

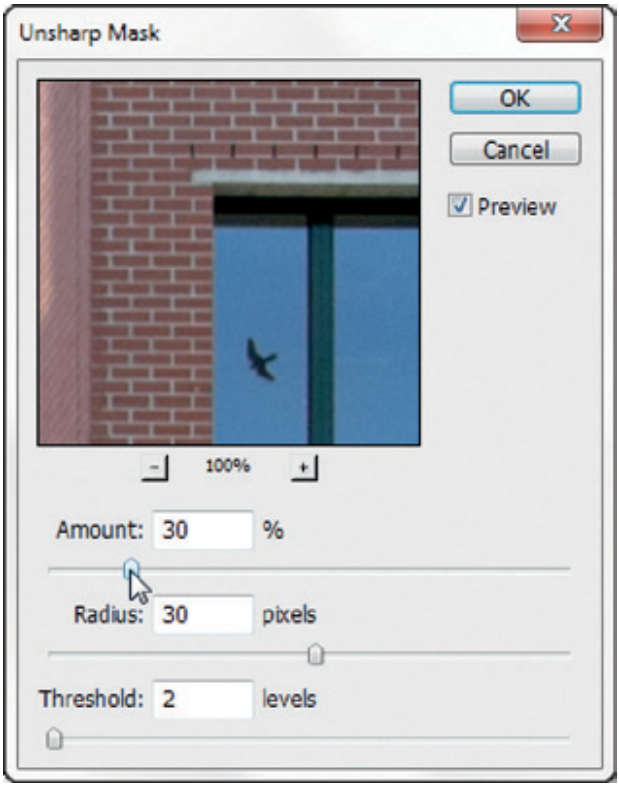


Fig. 266

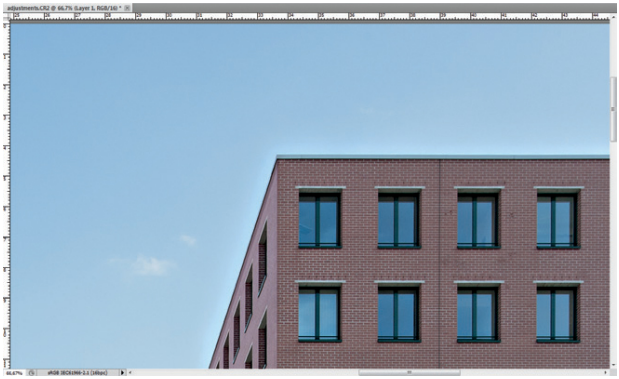


Fig. 267

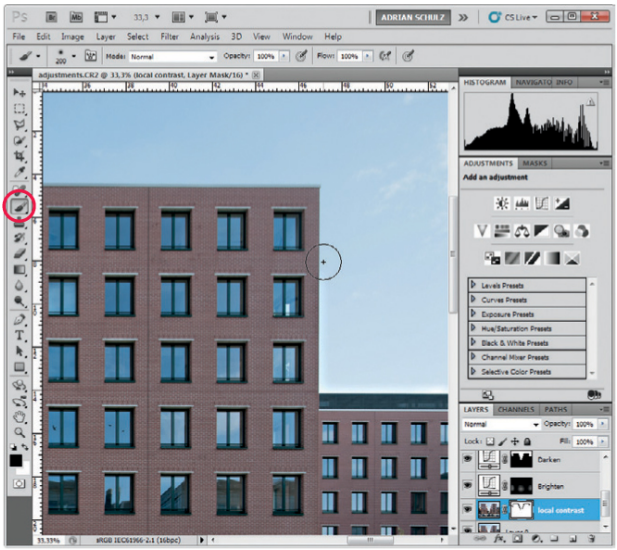


Fig. 268

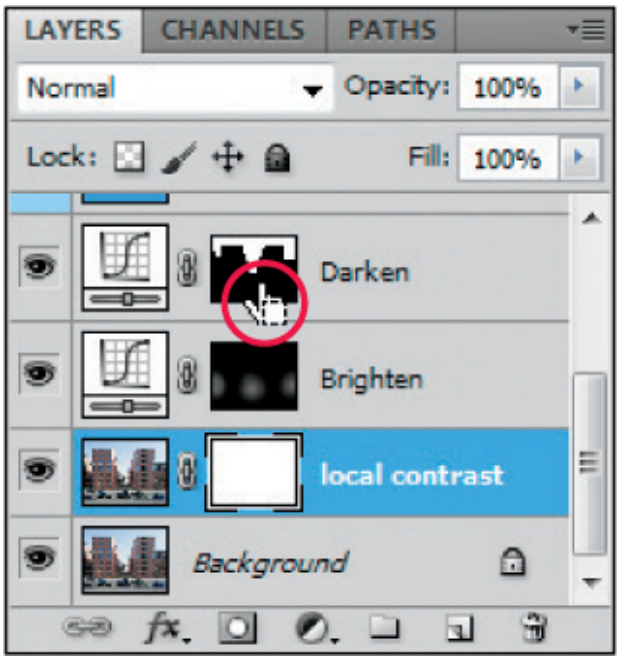


Fig. 269

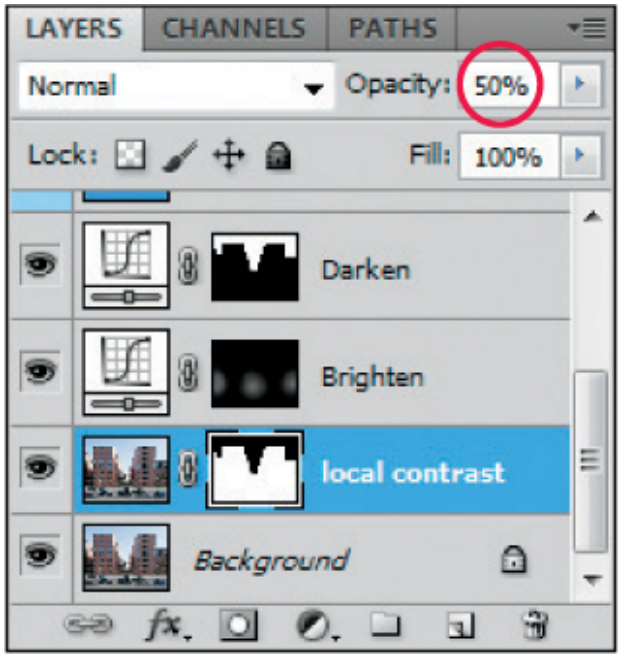


Fig. 270

9. **Sharpening** should always be the last step in the workflow. The *Filter* > *Smart Sharpen* command produces great results if you use a medium *Amount,* set *Radius* to between *0.3* and *1.0,* select the *Remove: Lens Blur* setting, and activate the *More Accurate* option (fig. 271). If you use *Amount* and *Radius* values that are too high, ugly sharpening artifacts will pop up (fig. 272). The *Advanced* options can be used to apply the effect selectively to shadows and highlight areas as necessary. Alternative sharpening tools include Photoshop's own *Unsharp Mask* command and a range of high-quality third-party tools that include Nik Sharpener Pro, Topaz In- Focus, or FocalBlade (fig. 273).

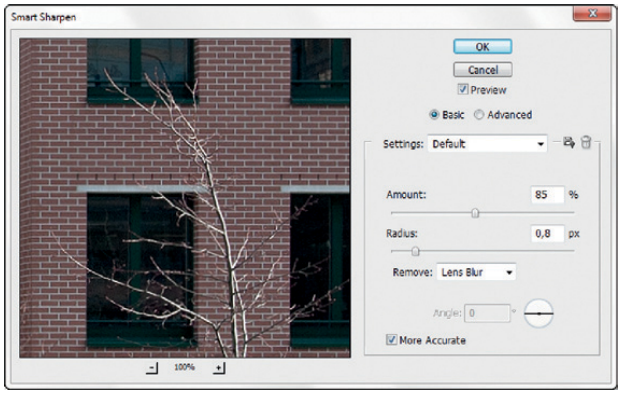


Fig. 271

Fig. 272

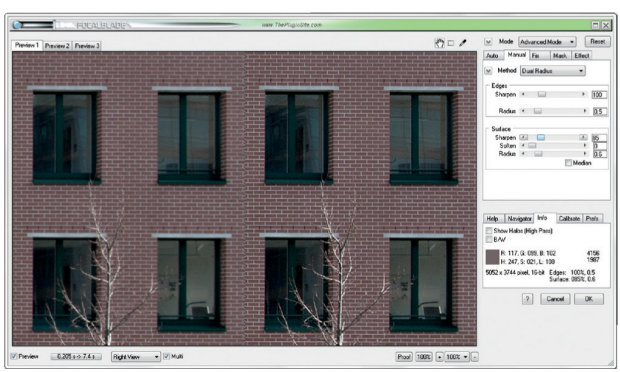


Fig. 273

10. Be sure to save your image before exiting Photoshop. The universal TIFF format or Photoshop's proprietary PSD format are best for **saving your image** losslessly and at high color depth, although both produce relatively large image files. TIFF images that contain large areas of uniform color can be effectively compressed using the (lossless) LZW or ZIP compression algorithms. If you are sure that you won't need to process your image any further, you can save disk space by converting it to 8 bpc before saving *(Image > Mode > 8 Bits/ Channel,* fig. 274). The 8-bit JPEG format saves even more disk space. If you do decide to use JPEG, select the lowest possible compression level, as additional compression appreciably reduces image quality. And remember, a JPEG image is subject to further quality loss every time you open and re-save it. Use a *Quality* setting of *10* or *11* when exporting JPEGs. If you are saving images for presentation on the Internet or a mobile device use the *Bicubic Sharper* interpolation method and a Web-compatible image size *(Image > Image Size ...)* such as 800 x 600 pixels. Then use the *Save for Web & Devices* command in the *File* menu, making sure that you select *JPEG* as you export format and *High* or *Very High* compression quality. This command automatically converts 16-bit images to 8-bit and removes any remaining Exif data (see page 182). If you deactivate the *Embed Color Profile* option, which we would not recommend doing, the color profile will be deleted.

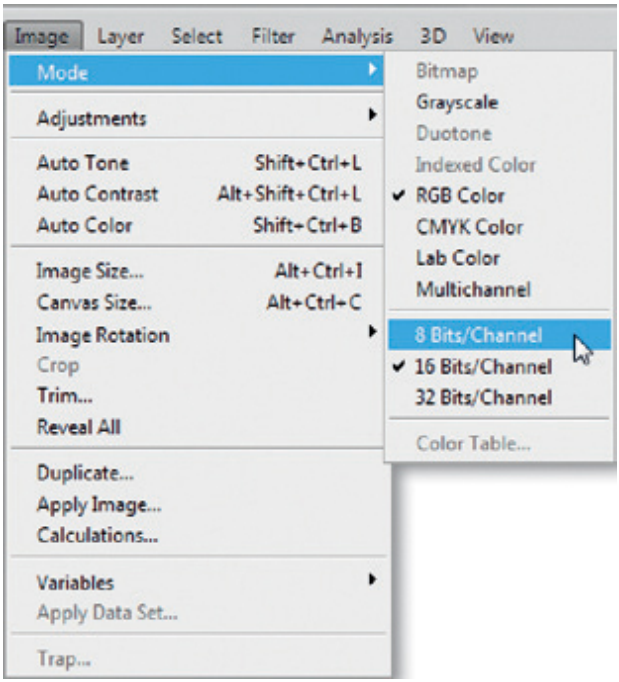


Fig. 274

Photoshop Image Adjustment Overview

- *Distortion correction*
- *Perspective correction*
- *Brightness and contrast adjustments*
- *Noise reduction*
- *Color corrections*
- *Contrast fine-tuning*
- *Sharpening*
- *Data storage*

Fig. 275: The adjustments we performed using Photoshop have greatly improved the overall look and feel of our original JPEG image

4.3.2 In-depth Processing: Selective Adjustments to Contrast and Brightness

Architectural photos often require selective brightening or darkening in specific image areas to counteract the effects of exposure errors or extreme subject contrast. The previous section

(4.3.1) details color range and layer mask techniques for performing selective corrections. This section describes some alternative methods of achieving similar effects, including using the Photoshop *Shadows/Highlights* command, the use of so-called "contrast masks", and the use of specialized plug-ins, such as LightMachine.

Workflow: Selective Contrast and Brightness Correction

1. Large portions of the façades in our sample image are too dark (fig. 276). The first option for correcting these is to use the Photoshop *Image > Adjustments > Shadows/Highlights* command. The default dialog shows just two sliders that allow you to adjust the *Amount* for *Shadows* or *Highlights,* while checking the *Show More Options* box gives you a much broader choice of options (fig. 277). To brighten dark image areas, use the *Amount, Tonal Width,* and *Radius* settings in the *Shadows* section of the dialog window. The *Amount* setting regulates the strength of the effect, but take care not to set it too high, otherwise your image will take on an unnatural look. Low *Tonal Width* settings cause the effect to be applied only to dark areas, while higher values affect lighter ones. Mid-range values usually produce good results. The *Radius* setting determines the size of the area around a shadow that will be affected. If you use a value that is too low, it can produce bright fringes, but if the value is too high, the effect will only be applied to large areas of uniform color. The dialog also provides *Color Correction* and *Midtone Contrast* sliders in the *Adjustments* section of the dialog for adjusting the colors and contrast in the areas you are currently correcting. Again, try not to set values that are too high. Leave the *Black Clip* and *White Clip* values unchanged.

Fig. 276

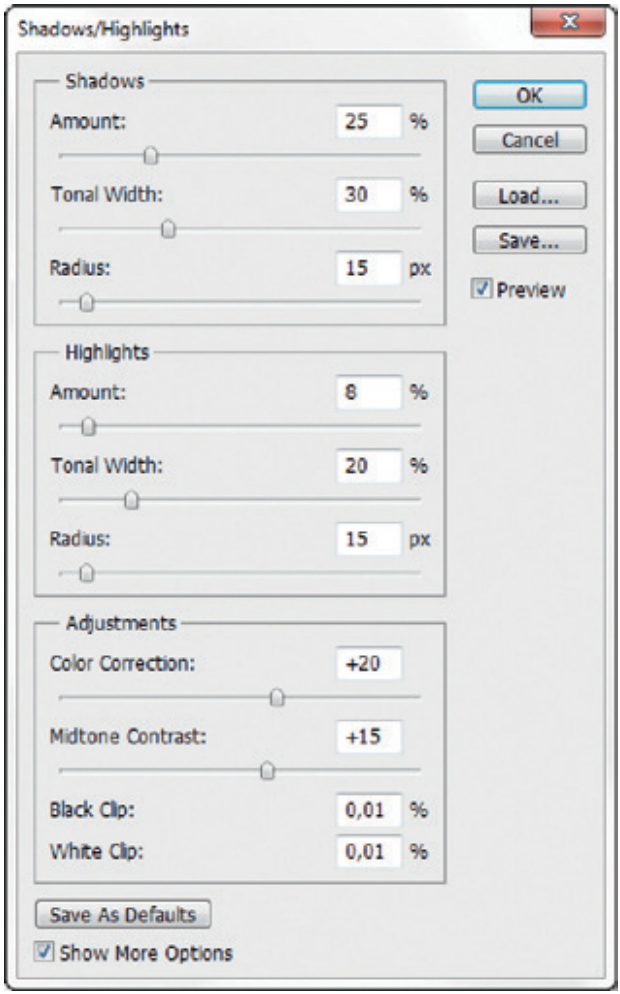

Shadows/Highlights
Shadows
Amount: 25 %
Tonal Width: 30 %
Radius: 15 px
Highlights
Amount: 8 %
Tonal Width: 20 %
Radius: 15 px
Adjustments
Color Correction: +20
Midtone Contrast: +15
Black Clip: 0,01 %
White Clip: 0,01 %
Save As Defaults
Show More Options
OK
Cancel
Load...
Save...
Preview

Fig. 277

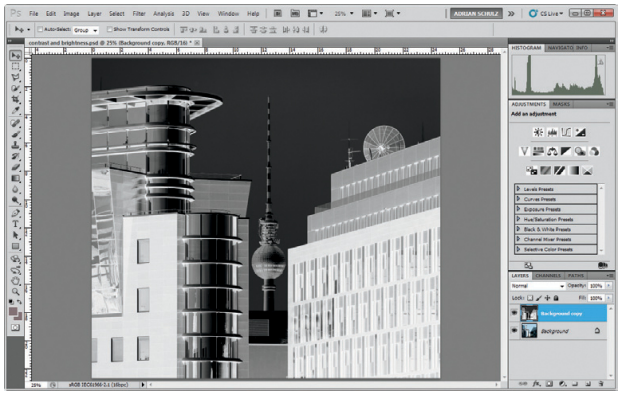


Fig. 278

2. A “contrast mask” is another effective way to brighten dark image areas. First, duplicate the background layer *(Layer > Duplicate Layer),* reduce saturation *(Image > Adjustments > Desaturate),* and convert the resulting image into a negative *(Image > Adjustments > Invert,* fig. 278). You can then apply the *Filter > Blur > Gaussian Blur...* filter using a Radius setting of between *5* and *15* pixels, according to the size of your image (fig. 279). Switch the blend mode to *Overlay* and reduce opacity to between *30* and *50 %* (fig. 280).

Fig. 279

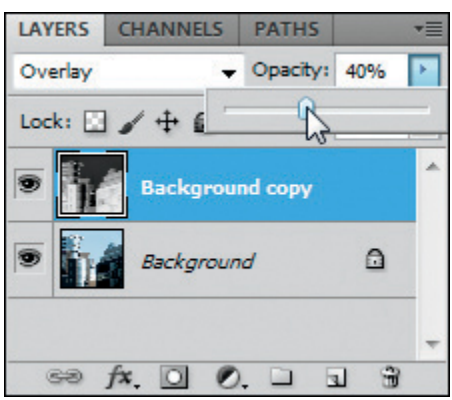


Fig. 280

3. Plug-ins like LightMachine (from The Plugin Site) work on a similar basis but are more precise and offer more individual options (fig. 281). LightMachine's *Shadows/Highlights Pro* mode allows you to selectively brighten or darken parts of your image, while the *Auto Mask* and *Fine-Tune* options are designed to help you eliminate fringing while preserving image contrast.

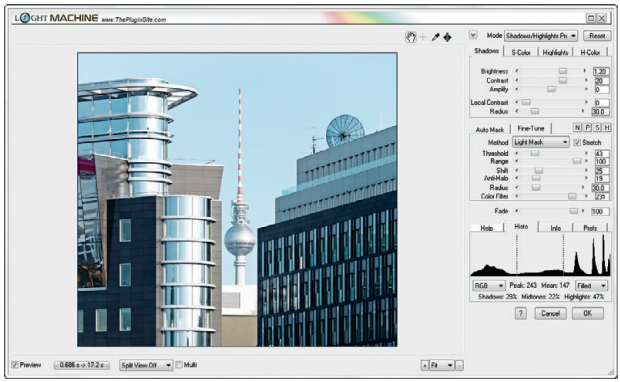


Fig. 281

Fig. 282: Clockwise from top left: The unprocessed image, adjusted using the Shadows/highlights tool, adjusted using a contrast mask, and adjusted using LightMachine

4.4 Panoramas

Merging multiple source images to form a panorama is not a regular feature of an architectural photographer's work, but some situations nevertheless make it a practical alternative shooting method. Panoramas can take on many forms, depending on the original concept for the image and the type and quality of your

source images. Spherical panoramas are suitable for display in an interactive context—for example, for displaying interiors on a computer. Cylindrical panoramas can be used to capture extremely wide angles of view and are thus suitable for portraying the complex architectural relationships that exist between multiple buildings on a single site. Flat (planar) panoramas and shift panoramas shot using tilt/shift lenses or shift adapters adhere to the rules of central projection and thus display buildings in a more familiar way. The following sections describe how to create planar panoramas for architectural use.

4.4.1 Creating a Planar Panorama

Our first example shows three images of the German Historical Museum in Berlin, shot handheld in portrait format without the use of any special accessories (fig. 283). There are a great many specialized "stitching" programs available for constructing panoramas, and the following sections illustrate the process using both the free, platform-independent Hugin package and Photoshop.

Workflow: Creating a Planar Panorama Using Hugin

1. Before you import your source images into Hugin, you should perform a RAW conversion that includes corrections for chromatic aberrations and vignetting artifacts, as these types of errors cannot be corrected later in the process. It is also advisable to correct any lens errors using a plug-in such as PTLens or LensFix before stitching; then you will no longer have to correct distortion using Hugin. Ideally, you should save your prepared source images in TIFF format rather than JPEG.

Fig. 283

2. There are a few changes you should make to Hugin's *Preferences* when you use the program for the first time. Check the *Enable rotation search* option in the *Control Points Editor* tab (fig. 284) and activate the *Hugins CPFind + Celeste (slower but more accurate, no cps on clouds)* option as the default in the *Control Point Detectors* tab (fig. 285). You will get better results if you check the *Use alternative Enblend program* option (Enblend is included with the download) and select the path to the location where Enblend is stored (fig. 286).

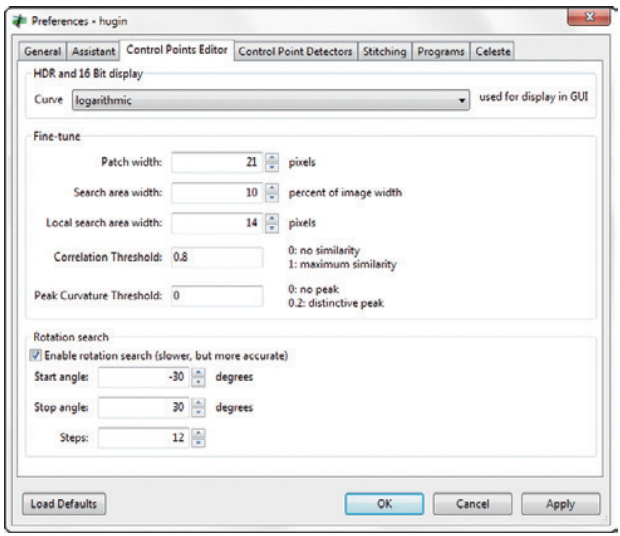


Fig. 284

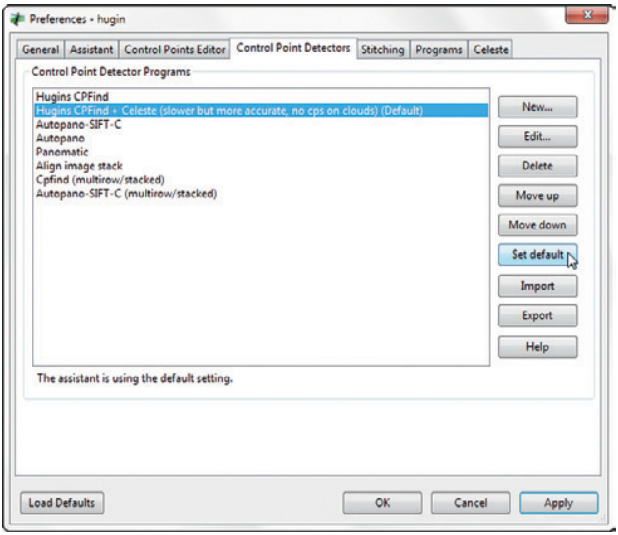


Fig. 285

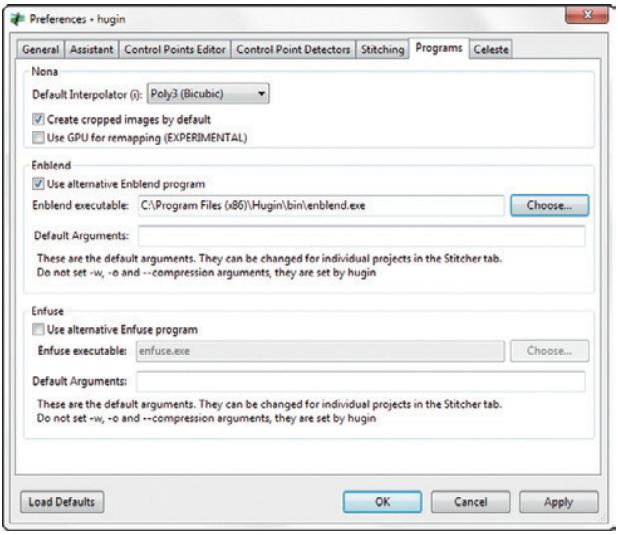


Fig. 286

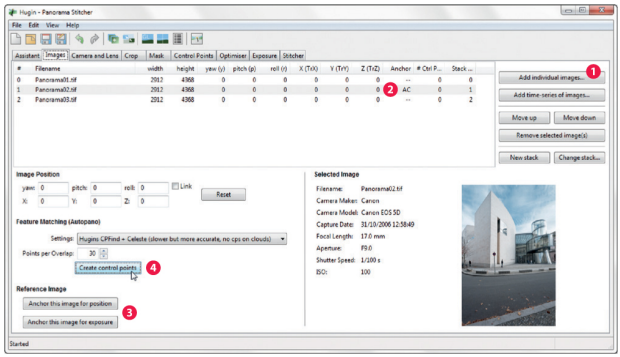


Fig. 287

3. Don't use the Assistant, but instead switch to the *Image* tab (fig. 287). We can now load our three source images using the *Add individual images* button ❶. The next step is to select the center image ❷ and activate the *position* and *exposure* anchor buttons ❸. We now use the *Create control points button* ❹ to automatically detect overlaps between the images. At this stage, values of far more than *10* can be used for the *Points per Overlap* option.

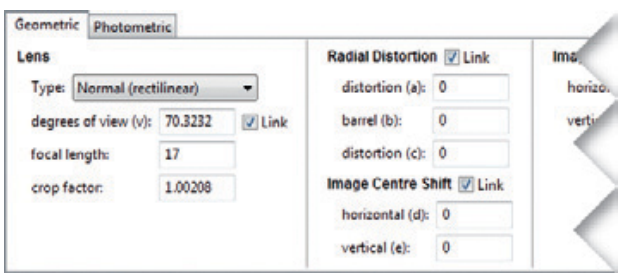


Fig. 288

4. Select *Normal (rectilinear)* in the *Lens* section of the *Camera and Lens* menu and, if the program hasn't detected them automatically, enter the *degrees of view, focal length,* and *crop factor* values. This can happen if your camera doesn't record Exif data with the images or if you use an adapted manual lens to shoot your images. Because we are using images in which vignetting and distortion have already been corrected, we can ignore the other settings in this menu (fig. 288).
5. We made no changes to the *Crop* and *Mask* settings in our sample workflow.
6. The settings in the *Control Points* tab are an important factor

in the production of high-quality results. For our sample images, the program detected a large number of corresponding points distributed throughout the frame (fig. 289), but to ensure really accurate stitching, you should nevertheless set a few manual control points along the major edges of your subject. To do this, click on a relevant point in the left-hand image. This will then be magnified in the preview window (fig. 290). This makes it simple to select a distinctive detail—in our case, an edge of the building's façade. The software usually finds the corresponding point in the right-hand image, too (fig. 291), although a little manual tweaking is sometimes necessary. Clicking *Add* confirms the new control point and adds it to the list. This procedure can be repeated as often as necessary.

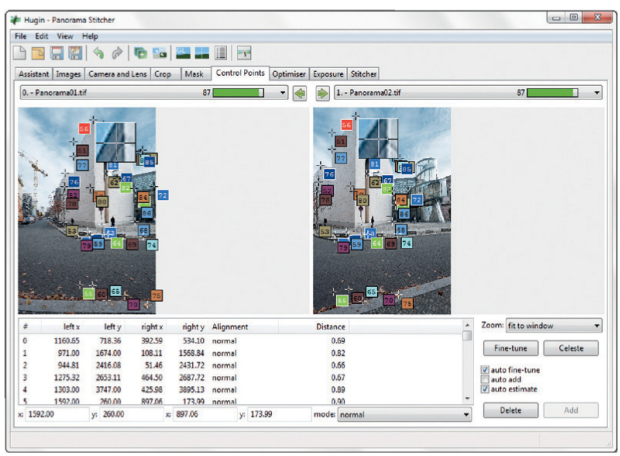


Fig. 289

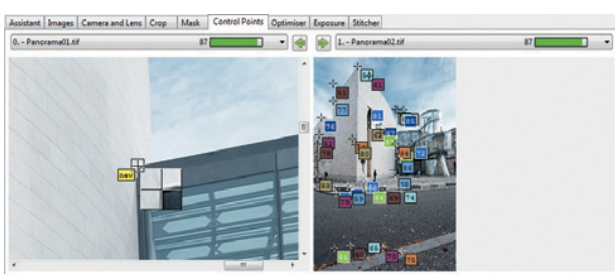


Fig. 290

7. The Optimizer menu is then used to adapt the source images to fit the control points. There are various methods for doing

this, and the best way to find out which is best suited to your particular panorama is trial and error. We selected *Positions (incremental, starting from anchor)* mode for our example. The results were very good, when you consider that our sequence was shot and panned handheld and has a maximum distance between control points of just 2.906635 pixels (fig. 292).

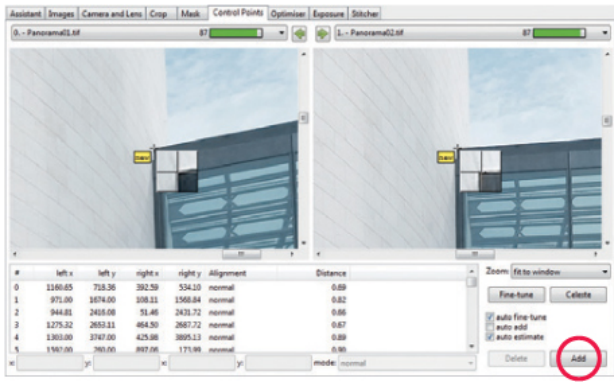


Fig. 291

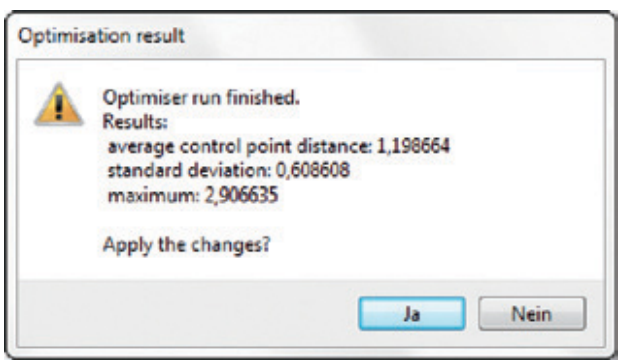


Fig. 292

8. At this stage, it is worth opening the preview window *(View > Preview window,* fig. 293). This allows you to fine-tune and align your panorama as well as selecting the projection type.

   To create a planar panorama, select *Rectilinear* ❶. If the preview image is too small, click *Fit* followed by *Update* ❷, or use the sliders to create a custom fit ❸. The *Straighten* command ❹ aligns your panorama fully automatically, although adjusting it manually usually leads to more accurate results. Click on a point that corresponds to the center of the

panorama at camera level 5. The program automatically eliminated the converging lines in our example. You can now close the preview window.

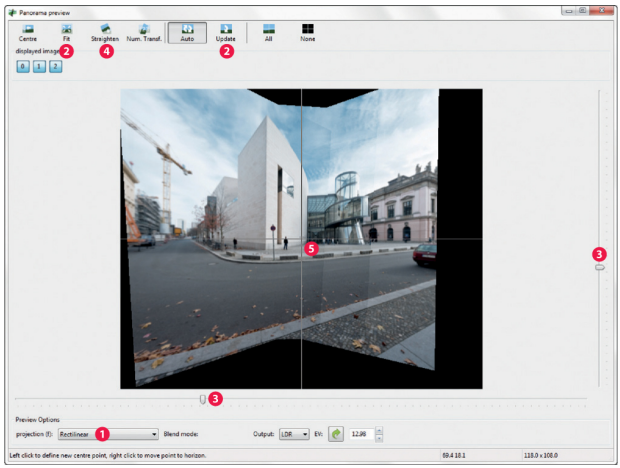


Fig. 293

9. The final *Stitcher* tab (fig. 294) is where you activate the *Calculate field of view* 1, *Calculate optimal size* 2, and *Panorama Outputs* options. Select *Exposure corrected, low dynamic range* and select the *TIFF* file format 3 to retain the maximum possible image quality for subsequent processing. Make sure that you select the *En-blend Processing* option 4. All that now remains is to click *Stitch!* and select a filename and the folder in which you want to save your panorama 5. The program now stitches your source images together at full resolution.
10. Use your favorite image processing program to crop the finished panorama and perform any necessary fine-tuning steps.

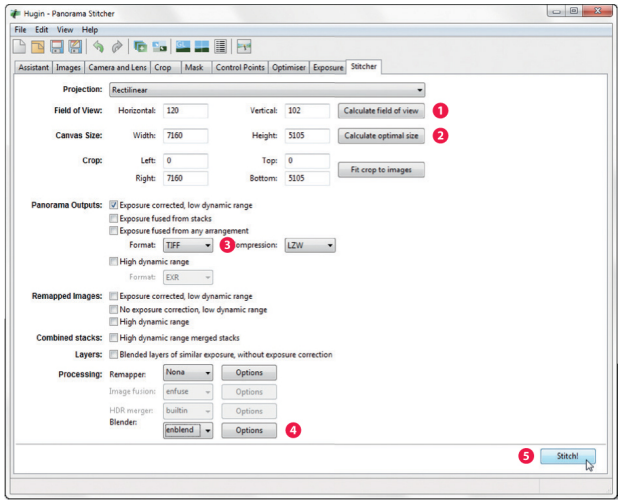


Fig. 294

Workflow: Creating a Planar Panorama Using Photoshop

1. Photoshop's own panorama creation tool is less complex than Hugin, but offers fewer options in the course of the workflow. Open the tool using the *File* > *Automate* > *Photomerge...* command. The resulting dialog requests you to select your source images and, in contrast to many other panorama programs, also allows you to select RAW image files. Again, if you want to stitch RAW images to make a panorama, perform any vignetting and chromatic aberration correction using a RAW converter first. If you are using Adobe Camera Raw, all you have to do is click *Done*—all changes you have made will then be incorporated in the subsequent panorama workflow. Once you have loaded your source images (our are TIFF files) and selected the *Perspective* option in the *Layout* section, click *OK* to start the automatic panorama creation process (fig. 295).
2. Although Photoshop displays the finished panorama as a single image, the individual source images are still stored on separate layers, making it simple to manually adjust the overlaps if necessary (fig. 296). If you are stitching three or more source images and your finished panorama is obviously distorted toward one end, make sure that the center image is the last in the list when selecting your images (fig. 297).

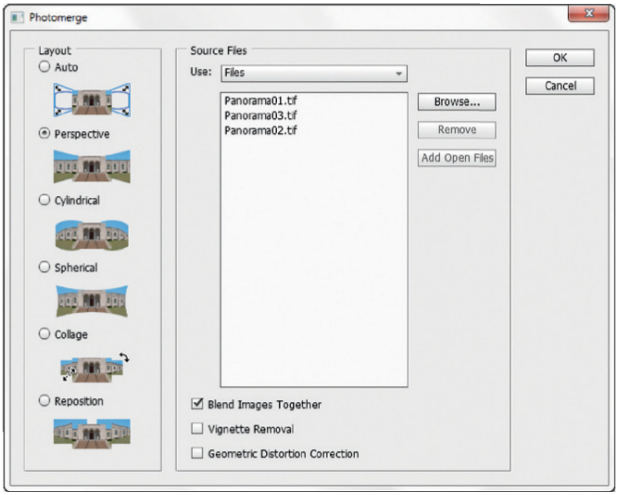


Fig. 295

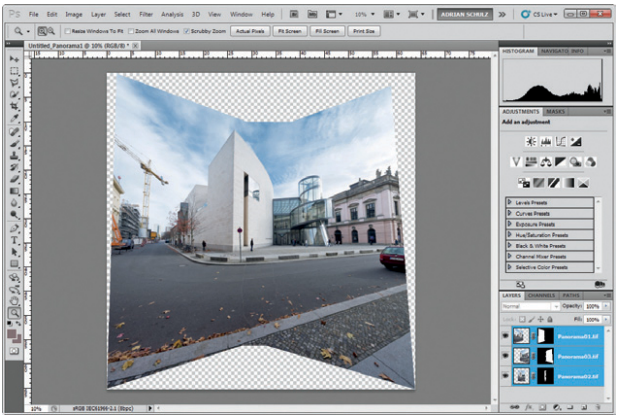


Fig. 296

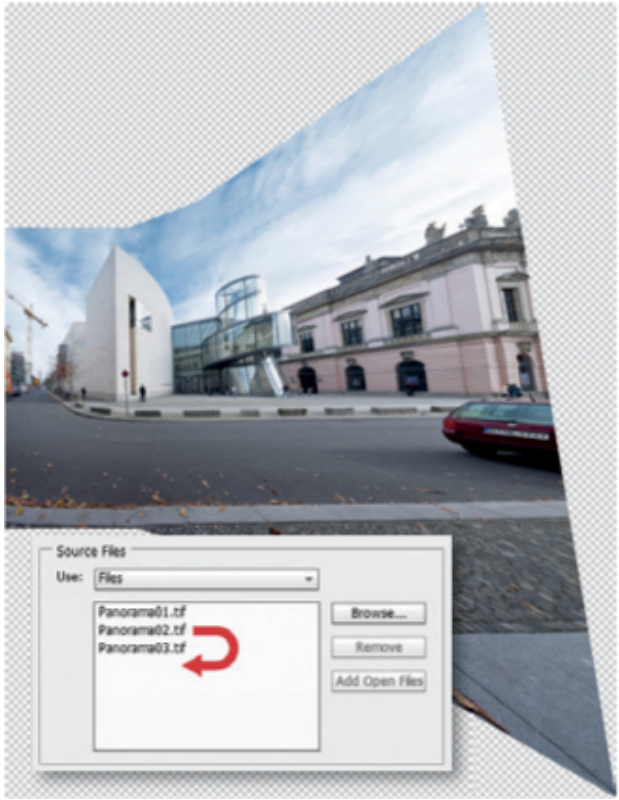


Fig. 297

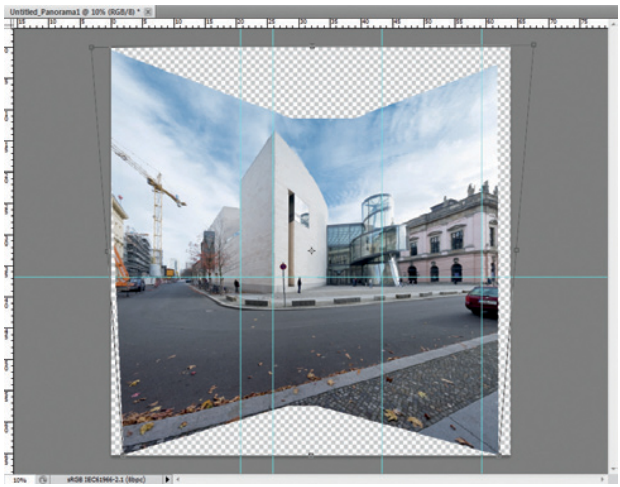


Fig. 298

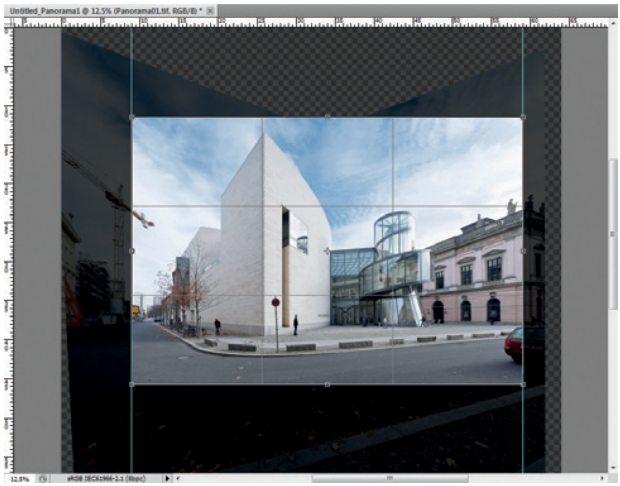


Fig. 299

3. Use the *Distort* and *Perspective* options for the *Edit* > *Transform* command to remove any converging lines. Turning on the grid or rulers from the *View* menu helps you align your image (fig. 298)
4. Crop your results using the *Crop* tool (fig. 299) and fine-tune brightness, contrast, color, and sharpness as necessary (fig. 121 shows our finished panorama).

4.4.2 Shift Panoramas

Panorama source images that are shot using shift lenses have a common line of vision. With regular shift lenses, the slightly shifted light path produces a very slight difference in perspective, which is negligible at the kinds of subject distances that are common in architectural photos. Some shift adapters are constructed in such a way that the adapter itself is attached to the tripod, making it possible to produce panorama source images with perfectly superimposed overlaps (fig. 123).

Workflow: Creating a Shift Panorama Using Photoshop

1. Our sample source images were shot in portrait format using a 24mm shift lens. The lens was shifted to “11 o’clock” in the first image and was then rotated through 60 degrees to “one o’clock” for the second. The result is two images with a large

overlap. Fig. 300 shows our identically converted source images opened in Photoshop. We then used the *Move* tool to position the right-hand image over the left-hand one (fig. 301), which merges the two source images together. We now close the right-hand image and continue to work on the combined left-hand one.

Fig. 300

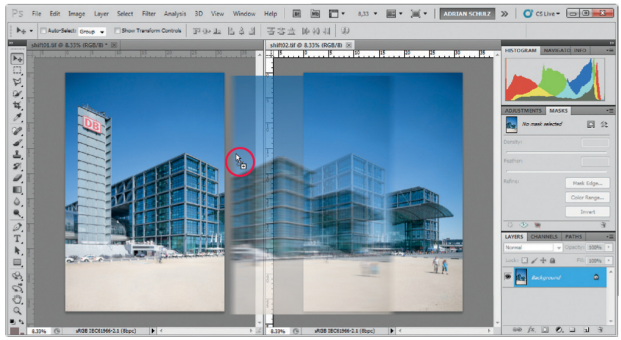


Fig. 301

2. To **automatically** align the two layers, select both while pressing the Shift key (fig. 302) and apply the *Auto-Align Layers* command from the *Edit* menu (fig. 303). Select the *Perspective* option in the dialog that follows and click *OK* (fig. 304). Photoshop then aligns the layers and adjusts the size of the canvas appropriately. You can align images **manually** if you want, although this does involve a lot more effort. First, you have to extend the canvas to the right using the *Layer* > *New* > *Layer from Background...* command, or by double clicking the *Background* layer in the Layers panel. You then

have to use the *Image* > *Canvas Size* ... command (with the *Relative* option deactivated) to select appropriate *Width* and *Height* values. Activate the left-hand center square as your *Anchor* (fig. 305) to ensure that the canvas is extended to the right and click *OK*. Select a 100% view and reduce opacity for the upper layer to 50% and use the *Move* tool to fine-tune the alignment—the reduced opacity makes it simple to superimpose details using the arrow keys (fig. 306).

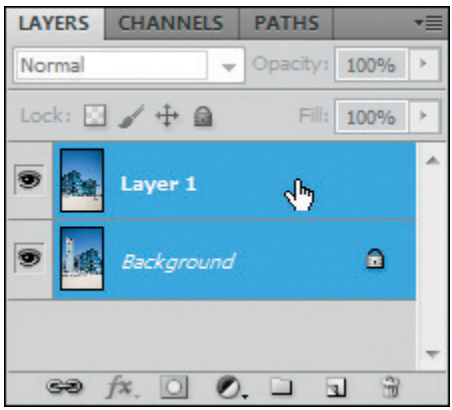


Fig. 302

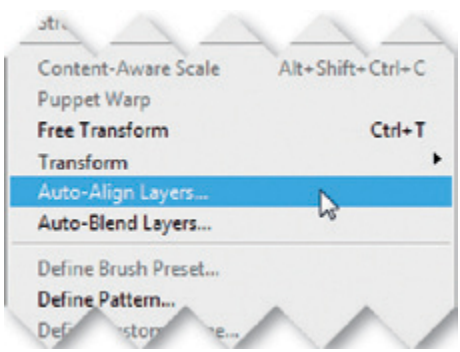


Fig. 303

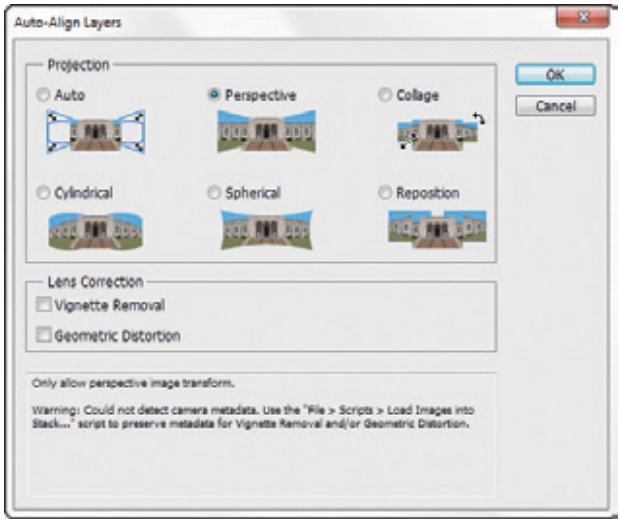


Fig. 304

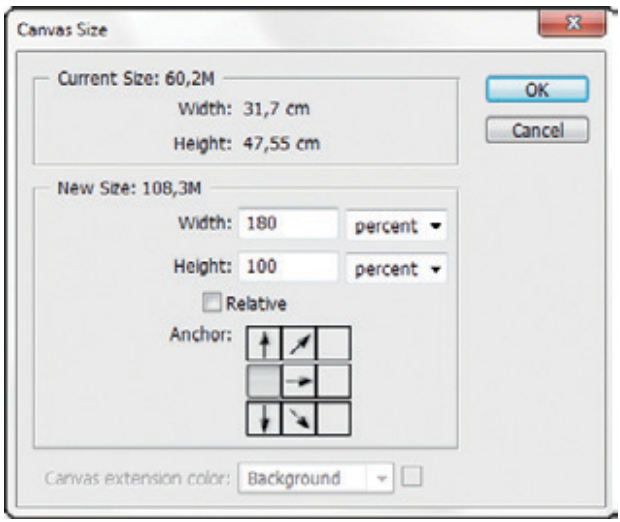


Fig. 305

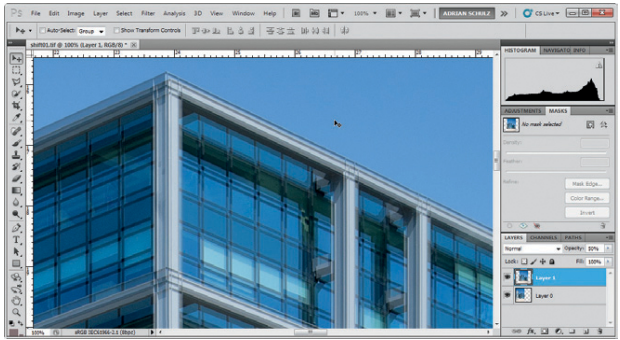


Fig. 306

Fig. 307

3. A closer look at the automatically aligned image will reveal differences in brightness where the two source images overlap (fig. 307). These result from the slight differences in lighting that always occur between panorama source images shot one after the other, even if the pause is only slight and the camera settings are the same. Small changes in cloud cover or even shadows produced by the edge of the camera's mirror box can cause this type of subtle change. To **automatically** correct this type of error, use the *Auto-Blend Layers...* command from the *Edit* menu. Select the *Panorama* option in the following dialog and click *OK*. This blends the two source images seamlessly and creates manually adjustable layer masks for each (fig. 308). You can now use the *Crop* tool to iron out any remaining inconsistencies in the overlaps (fig. 309). You can also perform the same procedure **manually.** This involves manually creating a soft overlap to coincide with details within the source images and disguise any mismatch caused by shifting the lens. Using selected image details for the

overlap makes it much easier to hide than using an obvious straight edge. We created our overlap using a layer mask and either the *Polygon Lasso* tool or the *Magnetic Lasso* tool (fig. 310) to make a selection that automatically adheres to the outline of the selected detail. The selection can then be fine-tuned using the *Rectangular Marquee* tool (with the shift key pressed) until the part of the upper layer that we wish to keep is precisely outlined (fig. 311). Clicking the *Add Layer Mask* button (fig. 312) produces a subtle overlap that follows the textures within the image. The *Dodge* and *Burn* tools can then be used to correct any remaining differences in brightness between neighboring image areas. Select a large, soft brush tip and a low *Exposure* value. The *Range* setting you use will depend on the overall brightness of the areas you are correcting (fig. 313). It also helps to blur large areas of uniform color in the layer mask (such as the sky) using a large, soft brush tip and a very low *Hardness* value (fig. 314). Setting a *Feather* value of between *5* and *15* pixels is a final touch that helps to make the overlap completely invisible.

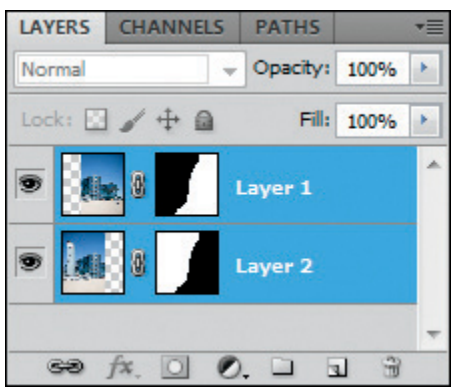


Fig. 308

Fig. 309

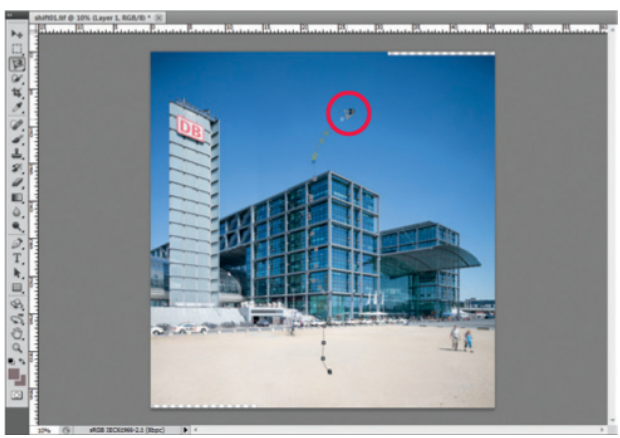


Fig. 310

Fig. 311

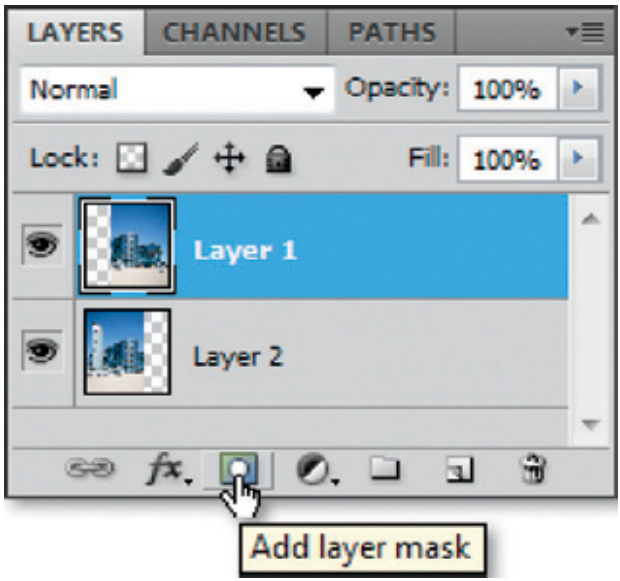


Fig. 312

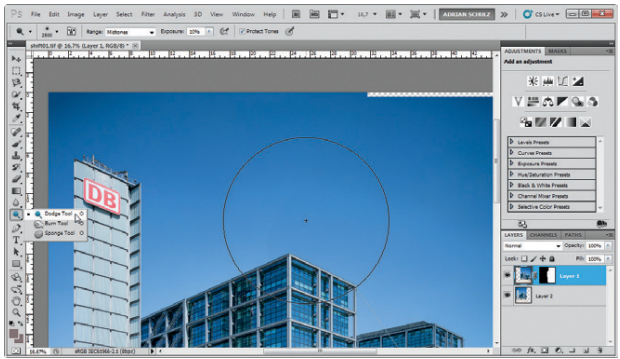


Fig. 313

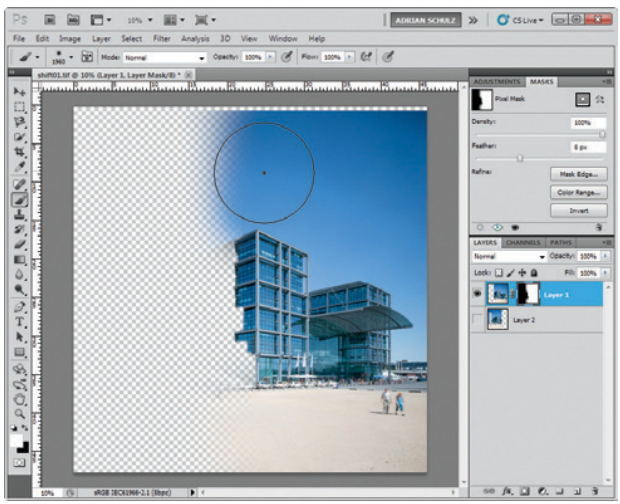


Fig. 314

4. You can now flatten your image *(Layer > flatten Image)*, and continue with your workflow. Fig. 122 shows our finished panorama.

4.5 HDR and DRI Images

HDR/DRI source images are shot using a bracketing sequence with varied exposure settings. This technique is used to portray subjects whose dynamic range exceeds that which the film or image sensor being used can capture in a single image. HDR techniques merge the extended dynamic range encompassed in multiple source images into a single 32-bit high-dynamic-range (HDR) image which

is then compressed using a technique called “tone mapping” into an 8-bit or 16-bit format that can be displayed or printed using conventional output devices. DRI techniques merge multiple source images without increasing bit depth. HDR images are generally less realistic looking than DRI images, making the latter preferable for situations in which realism is critical.

There is a wide range of specialized HDR/DRI software available, and the following sections demonstrate how to perform the processes using the HDR and DRI-capable Photomatix Pro 4.1 from HDRsoft, as well as using Photoshop. We will use Photoshop to perform automated 32-bit HDR processing as well as a manual DRI workflow.

4.5.1 Workflow: Creating an HDR Image Using Photomatix Pro

Although Photomatix Pro is capable of opening a range of RAW formats, we converted our bracketing sequence (fig. 315) in advance to 16-bit TIFF format. We took this route because lens-based errors such as chromatic aberration or vignetting are more difficult to correct once HDR processing has taken place.

Fig. 315

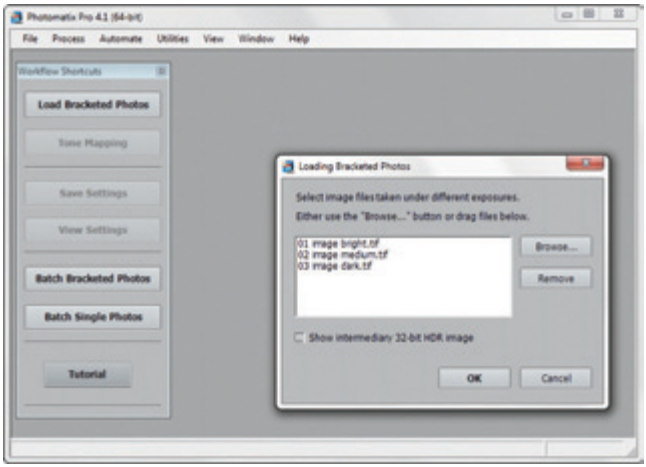


Fig. 316

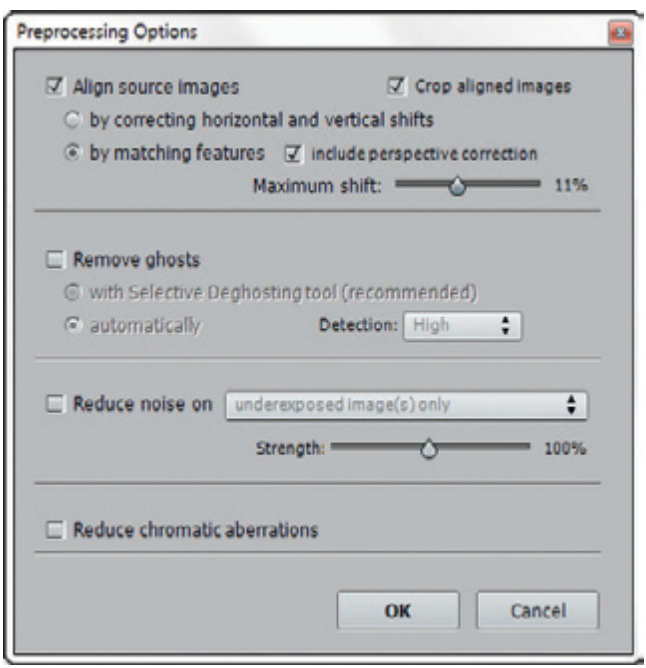


Fig. 317

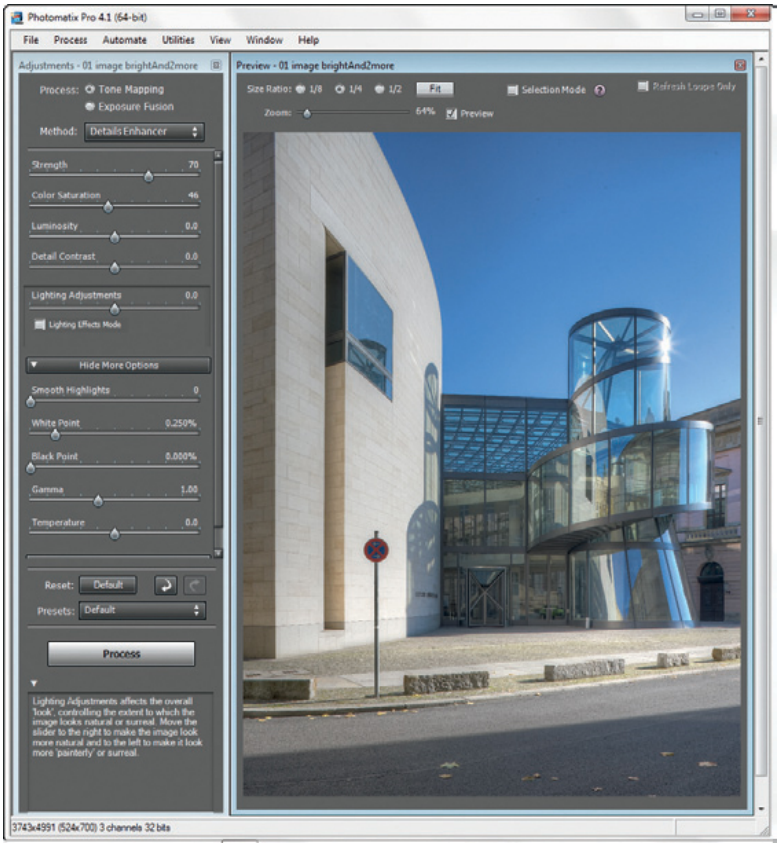


Fig. 318

1. Click the *Load Bracketed Photos* and select the images you want to merge in any order. It is not necessary to check the *Show intermediary 32-bit HDR image* option a this stage. Now click *OK* (fig. 316).

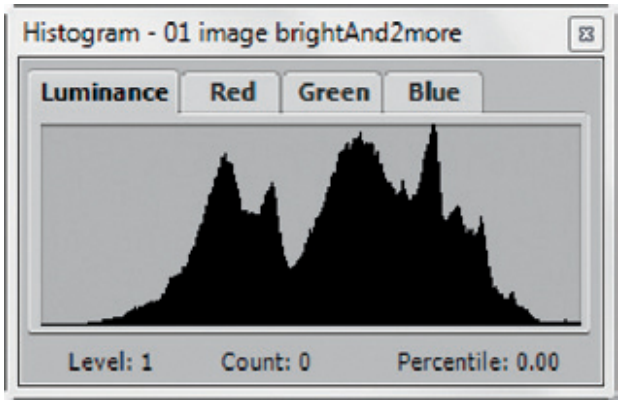


Fig. 319

2. Even if you shot your source images using a tripod, you should activate the *Align source images > by matching features* and *Crop aligned images* options in the dialog that follows. You only need to select the *Remove ghosts* option if your source images contain objects (such as people or tree branches) that moved between shots. This is not the case in our example. We also have no use for the *Reduce noise* and *Reduce chromatic aberrations* options, as these are only relevant when we are processing unconverted RAW images. Now click *Preprocess* to continue (fig. 317).
3. The following dialog includes tools for adjusting the parameters for both the *Details Enhancer* and *Tone Compressor* tone mapping methods. The dialog also includes a preview window that displays the changes you make in real time (fig. 318) and a histogram display for checking the distribution of tonal values within your image (fig. 319).
4. The *Details Enhancer* tone mapping method increases local contrast and produces results that look more like a painting than a photograph (fig. 161). The default settings produced a somewhat muddy look in our sample sequence, which we counteracted by adjusting the *Luminosity* setting and the *White Point, Black Point,* and *Gamma* sliders in the *Tone Settings* menu. Using *Strength* values that are too high also produces unrealistic looking images. You can fine-tune microcontrast using the *Micro-smoothing (Advanced Options)* slider, and the *Color Saturation* and *Temperature* settings can be adjusted to suit your particular image (fig. 320). The

optimum settings vary enormously from image to image, so trial and error is the best way to find out which work best. Our aim was not to produce a dramatically tone-mapped image, but rather a natural looking one that forms the basis for further processing in Photoshop. Clicking the *Process* button tone maps the image according to the settings made in the previous steps.

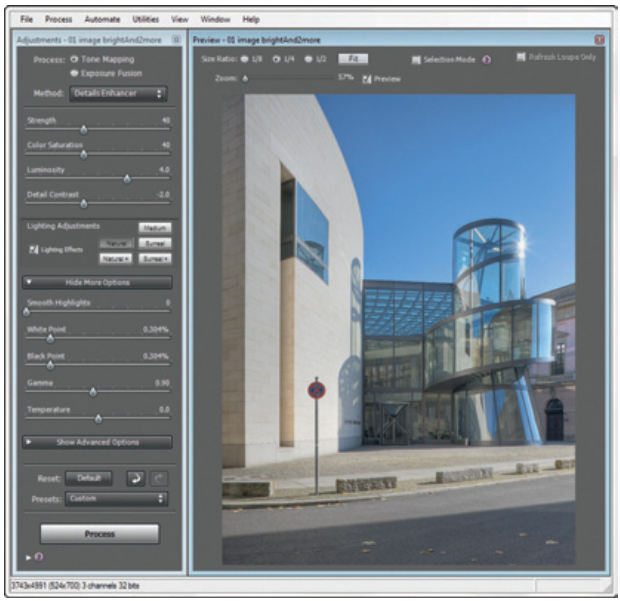


Fig. 320

5. The tone mapped image will now appear in the main program window, and you can save it for later processing using the *File > Save As...* command (fig. 321). You can also use the *Save Settings* button to save the settings you used as a preset for later application to other images.

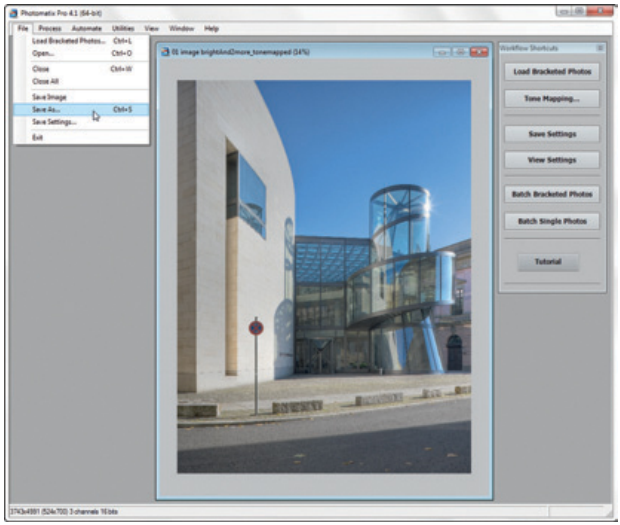


Fig. 321

6. It is often useful to produce a second version of an image using the *Tone Compressor* tone mapping method. This method makes global adjustments to contrast and offers fewer processing options. It also tends to produce more natural looking results, although detail in particularly bright or dark image areas gets lost more easily. Select the *Tone Compressor* method (fig. 322) and use the *Brightness, Tonal Range Compression,* and *Contrast Adaptation* sliders to make the basic settings for your image. Here too, the settings you make will depend on the type of image you are processing and the results you are aiming for. The method's other sliders are used to adjust image colors and to determine *White-* and *Black Point.* Click *Process* to apply your changes and save your image.

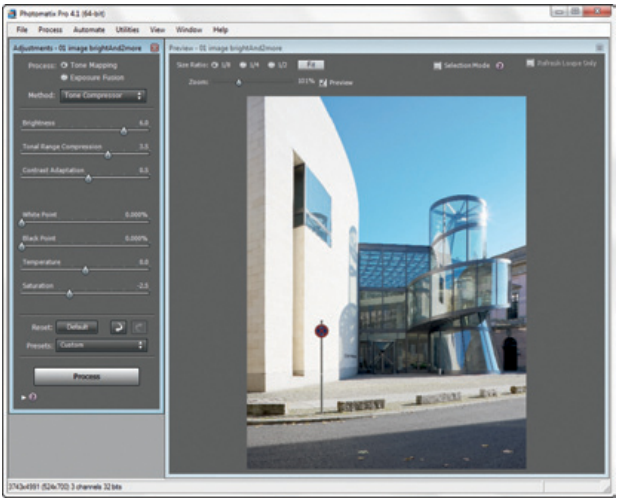


Fig. 322

4.5.2 Workflow: DRI Processing in Photomatix Pro

Photomatix Pro's DRI functionality uses the image detail data stored in the highlights and shadows of your source images to create a new, enhanced-contrast image without altering the original color space or bit depth—i.e., no "real" HDR images are created during the process.

1. Load your source images as described in the previous sections.
2. Select the *Exposure Fusion* process and the *Adjust* method (fig. 323). You can then use the *Accentuation, Blending Point, Shadows,* and *Mid-tone* sliders to adjust your image as necessary, and take care not to overdo things when adjusting the other, color-related sliders. Clicking anywhere in the preview image opens the Loupe window and gives you a detailed view of the effect of your adjustments (fig. 324). Once again, clicking *Process* merges the source images into one.

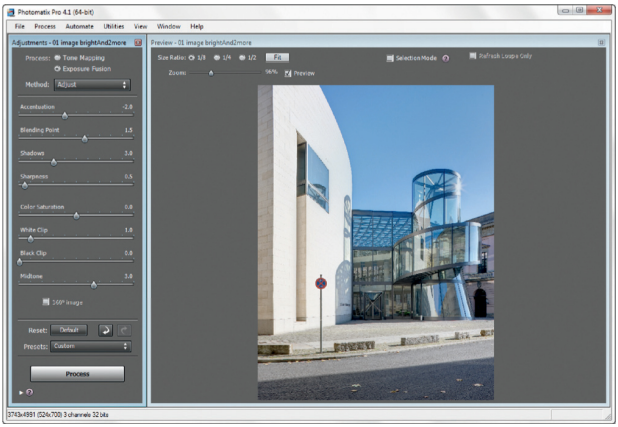


Fig. 323

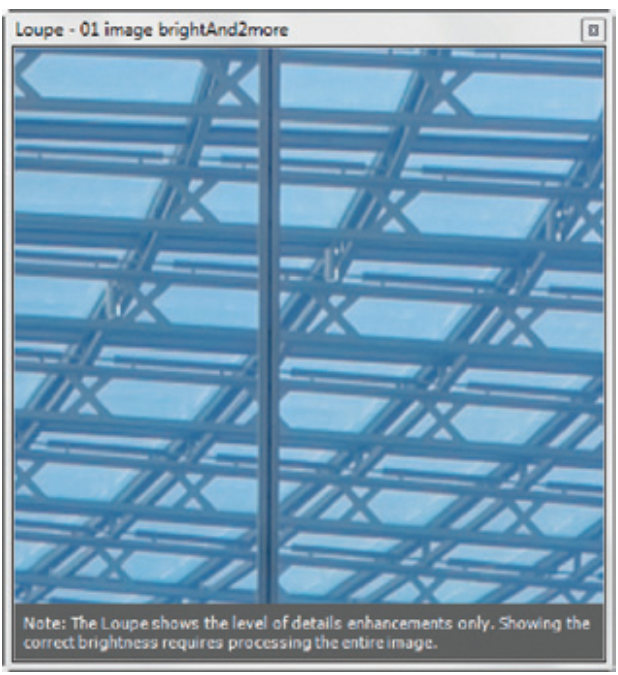


Fig. 324

4.5.3 Workflow: Creating an HDR Image Using Photoshop

1. Photoshop's own built-in HDR tool is located under the *File* > *Automate* > *Merge to HDR Pro...* command. Because the entire process takes place within the Photoshop environment, you

can use any RAW format that is supported by Adobe Camera Raw. This tool, too, works best if you use it to merge ready-optimized RAW images, although you can use source images stored in any other common format as well (fig. 325).

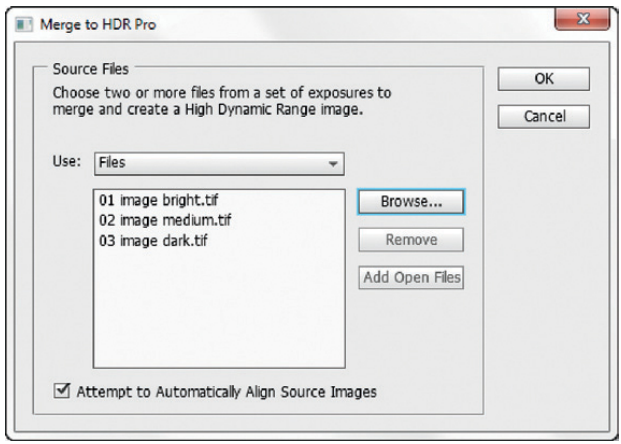


Fig. 325

2. Clicking *OK* starts the automatic merging process. The program window then includes thumbnails for each image that display the exposure increments used while shooting the sequence. This information is taken from the image's Exif data (see page 182). If your files contain no Exif data, you can enter the exposure values manually in the *Manually Set EV* dialog that then appears automatically. Removing the tick from the check box next to an image deactivates it (fig. 326).
3. The correct choice of *Mode* is very important to the success of the procedure. If you select *8 Bit* or *16 Bit,* you can adjust your HDR conversion parameters manually, whereas if you select *32 Bit,* the process is, technically speaking, already finished—the *Set White Point Preview* setting does help to judge the effect the process has on various tonal ranges and adjusts the brightness of the preview image, but only actually alters the look of the inaccurate monitor image, not the range of contrast in the HDR image itself. Click *OK* to open the adjusted image and save it for further processing. You can then use the *Image* > *Mode* > *8 Bits/Channel* or *16 Bits/Channel* commands to open the *HDR Toning* dialog (fig. 327).

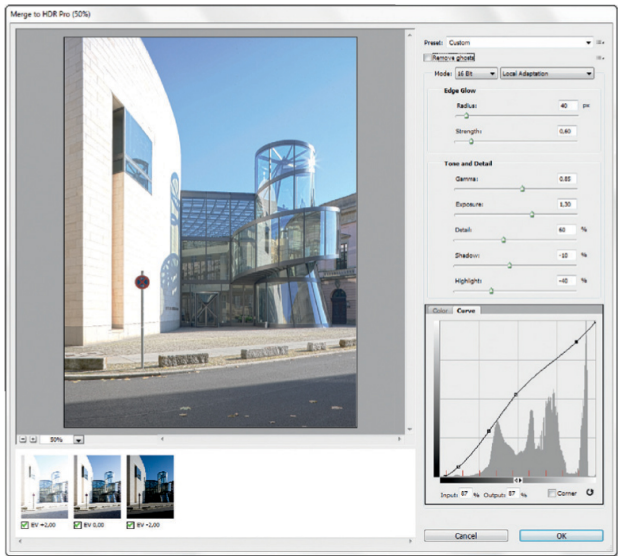


Fig. 326

4. There are various compression options available in 8-bit and 16bit modes. *Local Adaptation* is the most flexible. We cannot make any concrete recommendations for the *Radius* and *Strength* settings, but the ones shown in our example provided us with very good results. One very important factor in the compression process is the selection of appropriate adjustments to the *Tone Curve.* Activate the Curve window and shift the ends of the curve itself to the ends of the histogram peaks. Giving the curve a slight “S” shape increases overall contrast if necessary. Once you have made all the necessary changes, click *OK* to open the compressed HDR image for further processing.

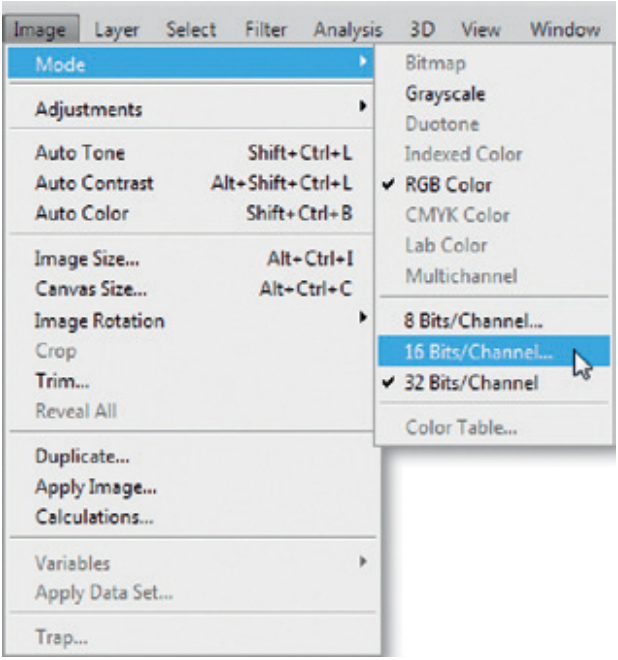


Fig. 327

4.5.4 Workflow: DRI Processing in Photoshop

1. Although it has no dedicated DRI tool, it is nevertheless possible to use Photoshop to manually merge individual source images from a bracketing sequence. To do this, use the *File > Scripts > Load Files into Stack...* command, choose your source files (fig. 328), click *Ok,* and then arrange the layers according to the sequence of exposure (the darkest image at the bottom).

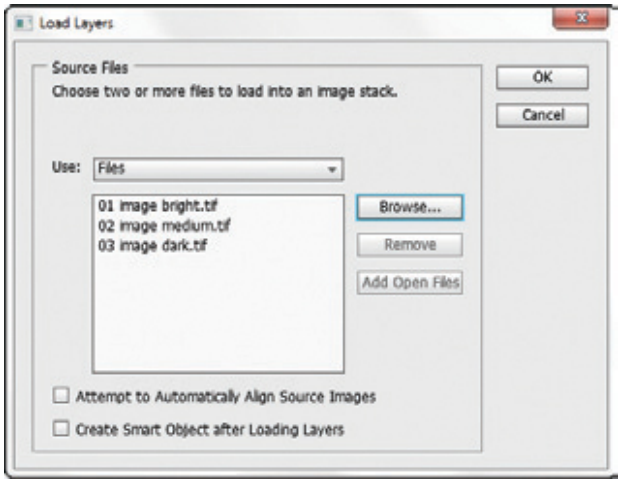


Fig. 328

2. Now hide the upper (brighter) two layers by clicking on the eye icons in the Layers panel (fig. 329) and activate the darkest image. Use the *Select* > *Shadows* option in the *Select* > *Color Range...* dialog to create a selection that only includes the darker parts of the lower image (fig. 330).

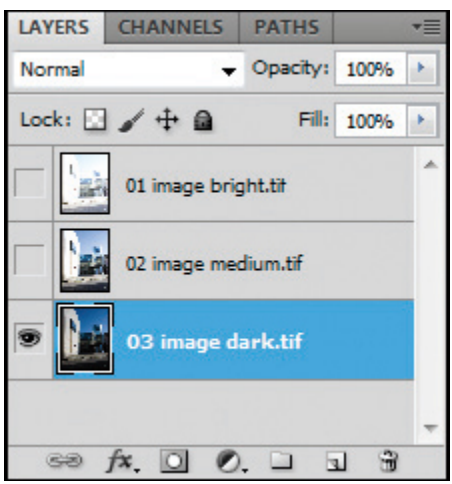


Fig. 329

3. Activate and show the middle layer and click the *Add Layer Mask* button at the bottom of the Layers panel (fig. 331). The parts of the layer mask that are black become transparent, while the original image remains visible in white areas.

4. Click the *Mask Edge ...* button in the *Masks* panel and activate the *Smart Radius* option with a value of between *40* and *80* pixels in the dialog that follows (fig. 332). Set the *Smooth* and *Contrast* sliders to *0* and *Feather* to less than *5*. Click *OK* to confirm your settings.
5. Repeat the same procedure (steps 2-4) with the next overlying layer.
6. Reduce opacity and *Density* (in the *Masks* panel) for the upper two layers (fig. 333). We used values of *50 %* in our example, but these vary widely from image to image.
7. Optimize your results by setting the *Feather* value in the *Masks* panel to between *100* and *250* pixels. This increases local contrast, but can produce halos at the transitions between high-contrast and uniformly colored image areas. These can be removed by painting directly into the active layer mask using a using a soft, black brush with a large Radius (fig. 334).
8. You can further refine your results by experimenting with different opacities and blend modes such as *Screen*.
9. Once you are done, flatten your image to a single layer using the *Layer* > *Flatten Image* command.

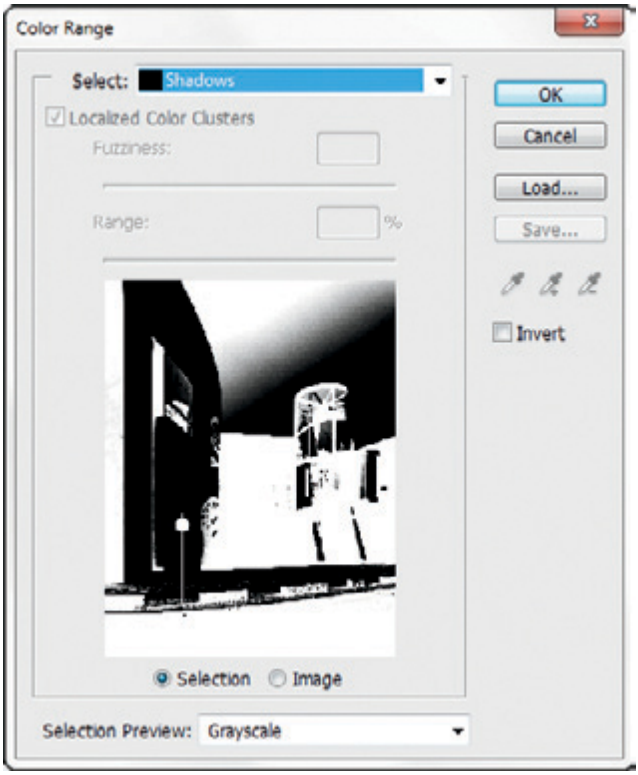

Color Range
Select:
Shadows
Localized Color Clusters
Fuzziness:
Range:
%
OK
Cancel
Load...
Save...
Invert
Selection
Image
Selection Preview:
Grayscale

Fig. 330

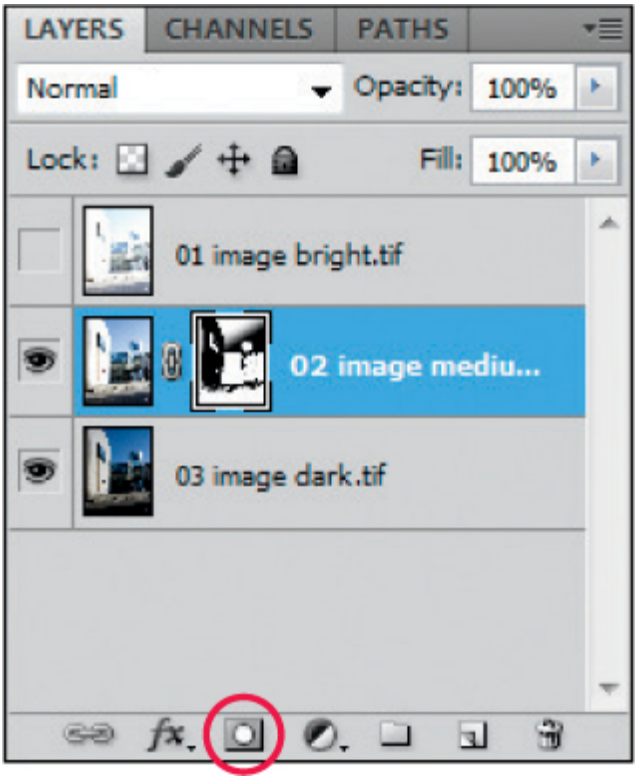

LAYERS
CHANNELS
PATHS
Normal
Opacity: 100%
Lock:
Fill: 100%
01 image bright.tif
02 image mediu...
03 image dark.tif

Fig. 331

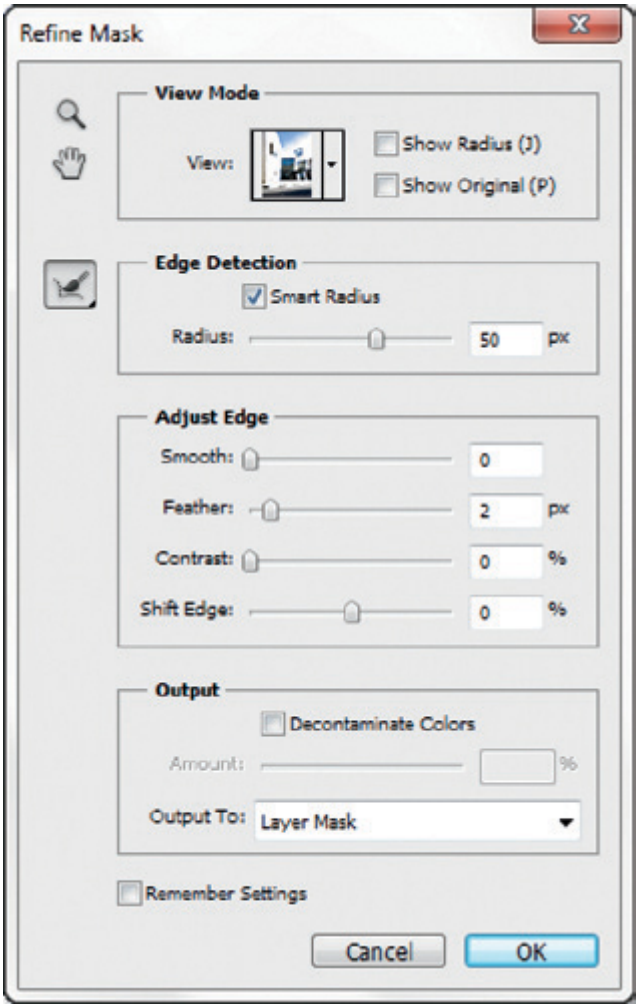

Refine Mask
View Mode
View:
Show Radius (J)
Show Original (P)
Edge Detection
Smart Radius
Radius:
50
px
Adjust Edge
Smooth:
0
Feather:
2
px
Contrast:
0
%
Shift Edge:
0
%
Output
Decontaminate Colors
Amount:
%
Output To:
Layer Mask
Remember Settings
Cancel
OK

Fig. 332

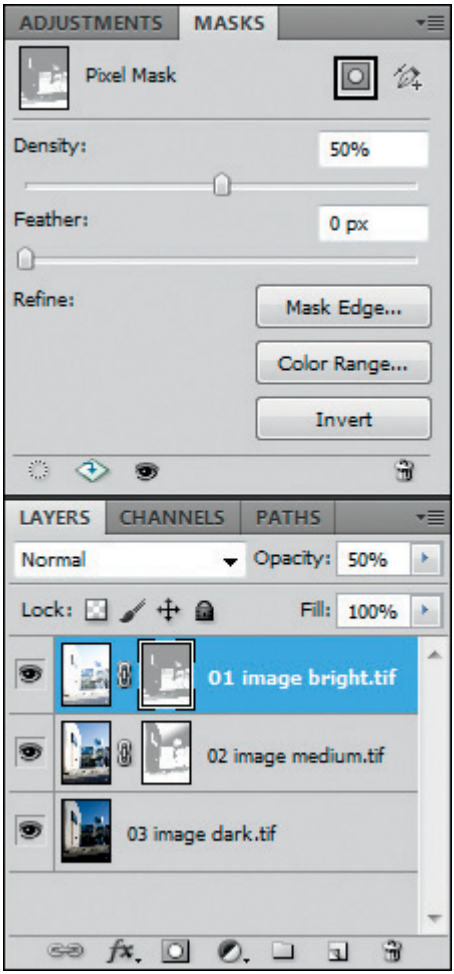

ADJUSTMENTS
MASKS
Pixel Mask
Density:
50%
Feather:
0 px
Refine:
Mask Edge...
Color Range...
Invert
LAYERS
CHANNELS
PATHS
Normal
Opacity:
50%
Lock:
Fill:
100%
01 image bright.tif
02 image medium.tif
03 image dark.tif

Fig. 333

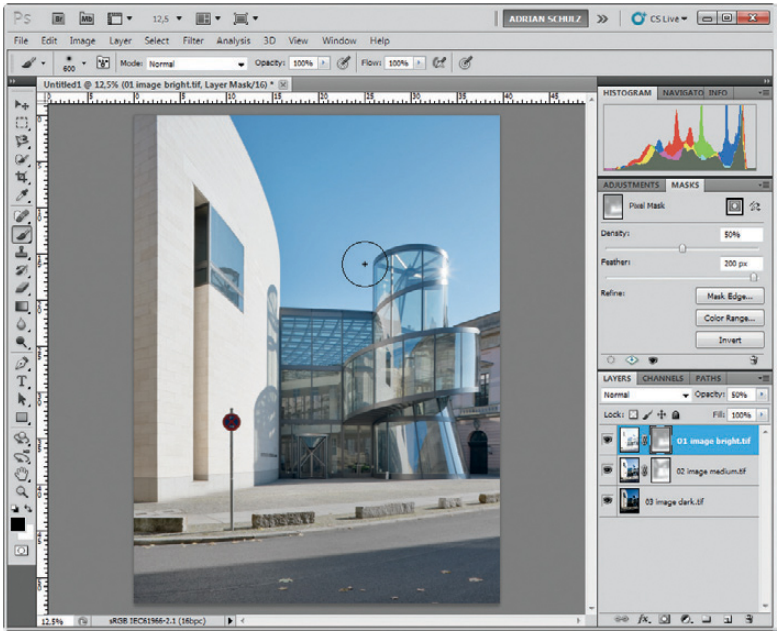

ADRIAN SCHURZ
File Edit Image Layer Select Filter Analysis 3D View Window Help
Mode: Normal
Opacity: 100%
Flow: 100%
Untitled1 @ 12,5% (01 image bright.tif, Layer Mask/16) *
HISTOGRAM NAVIGATO INFO
ADJUSTMENTS MASKS
Pixel Mask
Density: 50%
Feather: 200 px
Refine:
Mask Edge...
Color Range...
Invert
LAYERS CHANNELS PATHS
Normal
Opacity: 50%
Lock:
Fill: 100%
01 image bright.tif
02 image medium.tif
03 image dark.tif
12,5%
sRGB IEC61966-2.1 (16bpc)

Fig. 334

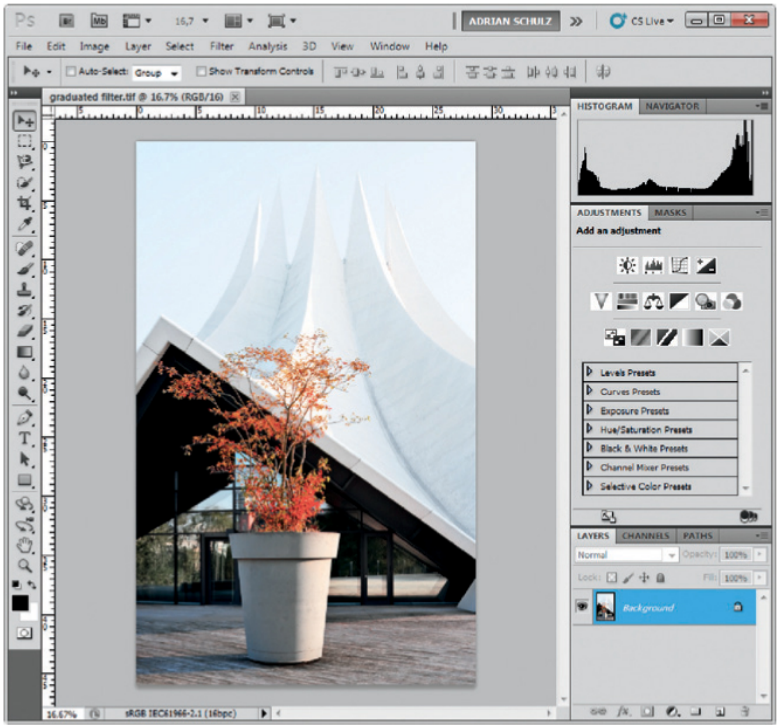


Fig. 335

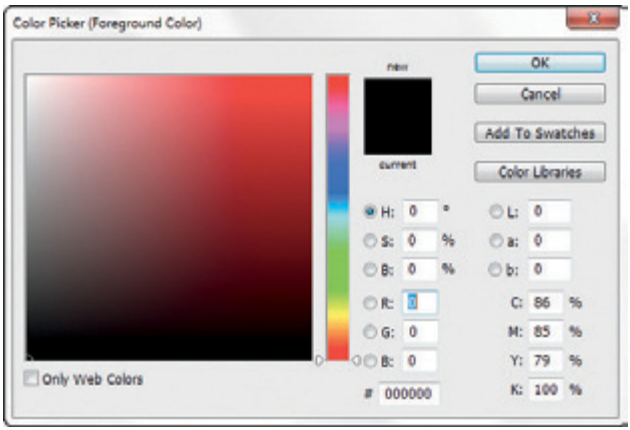


Fig. 336

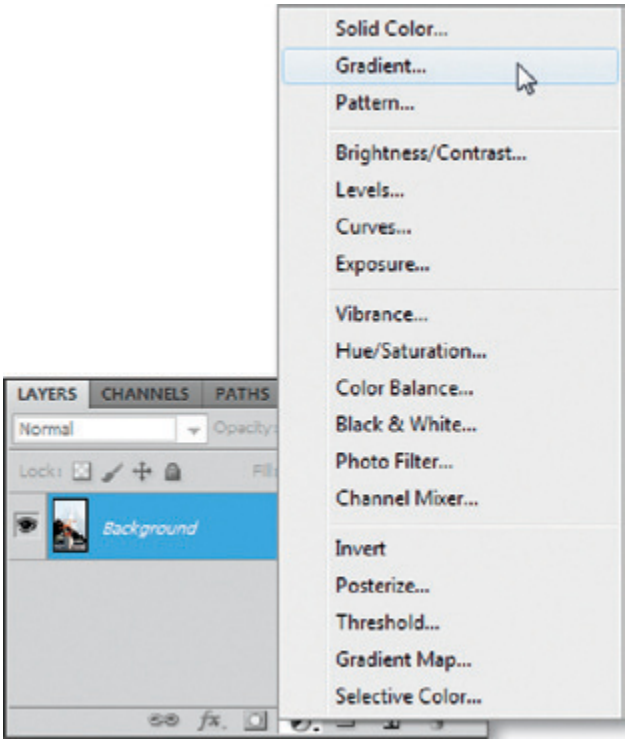


Fig. 337

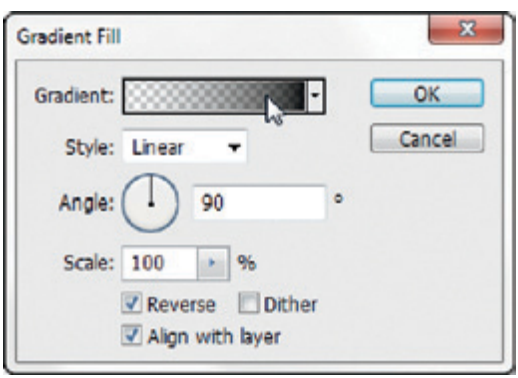


Fig. 338

4.6 Creative Tips and Tricks

The following sections offer a few ideas for experiments in creative image processing.

4.6.1 Digital Graduated Filters

A physical graduated filter affects the amount of light reaching the film or sensor during the exposure, whereas a digital filter can only be applied to the dynamic range of the captured image and is thus not as effective. It is nevertheless a useful tool that can be applied and removed at will using a separate layer. The steps for applying a digital gradient to our sample image (fig. 335) are as follows:

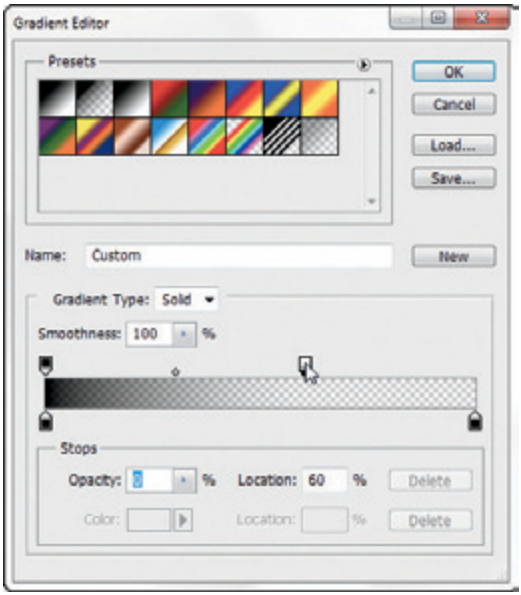


Fig. 339

Select the foreground color to black (fig. 336) and create a new fill layer using the *Layer > New Fill Layer > Gradient...* command (or by clicking the *Create a new fill or adjustment layer* button in the Layers panel and selecting *Gradient ...,* fig. 337). In the *Gradient Fill* dialog that follows, select the *Linear Style* option and an *Angle* value of *90.* Now activate the *Reverse* and *Align with layer* options and make sure that the *Scale* value is set to *100* (fig. 338). Now double click the gradient thumbnail to activate the *Gradient Editor.* Select the *Foreground to Transparent* preset and move the top right-hand preview slider to the left until the *Location* value is *60%* (fig. 339). Now click *OK* twice to return to the main program window. Select the *Soft Light* blend mode for the new fill layer (fig. 340). The new gradient fill can be adjusted at any time by double clicking the layer

thumbnail. The sequence of steps we have described can also be recorded as a Photoshop action, which you can then apply automatically to any other image.

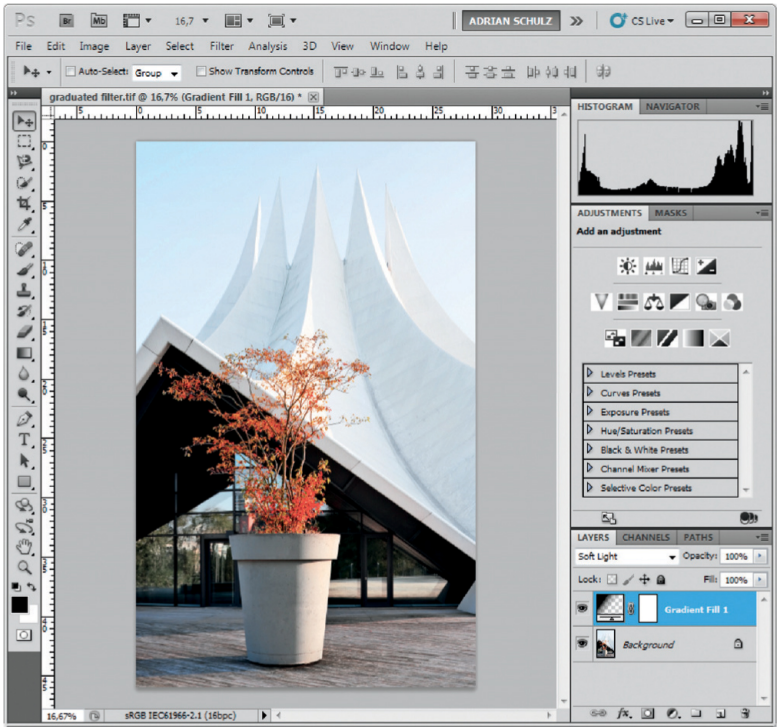


Fig. 340

4.6.2 Creating HDR Effects Using a Single RAW Source Image

RAW image files store much more detail than JPEG image files, especially in highlights and shadows. This section demonstrates how to use Photomatix Pro to use a single image file to create a "pseudo-HDR" image.

Open a RAW file or TIFF file using the *File* > *Open* command and then click the *Tone Mapping* button. This will convert your image into a pseudo-HDR image that can then be tone mapped in the usual way. This type of image displays more over-bright highlights and more noise than a "real" HDR image created from a sequence of source images (fig. 341). Photoshop has no built-in

pseudo-HDR functionality, but can be used to process an (ideally 16-bit) image using the *Image > Adjustments > HDR Toning...* dialog. You can also use Adobe Camera Raw to create two differently exposed versions of a single RAW file and manually merge them into a single DRI image (see section 4.5.4).

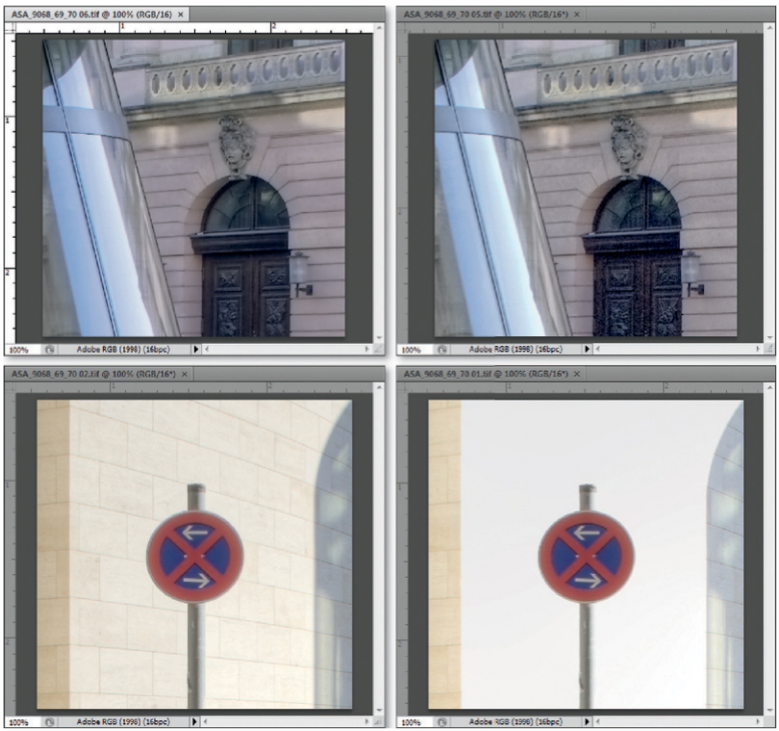


Fig. 341: Comparing an HDR image created from a bracketing sequence (on the left) with a pseudo-HDR image created using a single source photo

4.6.3 Converting Images to Black-and-White Using Photoshop

Photoshop includes a simple and effective tool for converting color images to black-and-white. It is advisable to apply the effect on a separate adjustment layer so that you can undo or adjust it if necessary. Either select the *Black & White* dialog in the *Adjustments* panel (fig. 342) or use the *Layer > New Adjustment Layer > Black & White...* command. The sliders in the dialog window allow you to

adjust the strength of various tonal ranges for the newly created monochrome version of your image. The further to the right you move a slider, the lighter its corresponding grayscale value will be, while the opposite is true for values toward the left-hand end of the scale (fig. 343). The tool includes a number of presets that simulate the effects of analog lens filters. The *Tint* option can be used to give your image an overall tint, and the default tone is sepia. You can adjust your black-and-white settings losslessly at any time by clicking on the adjustment layer thumbnail. You can also convert images to black-and-white in Photoshop by applying a saturation value of *-100* in the *Image* > *Adjustments* > *Hue/Saturation* dialog, or by applying the *Image* > *Adjustments* > *Desaturate* command, although both of these methods are not as flexible as the *Black & White* tool. There are also a number of black-and-white presets available in the *Image* > *Adjustments* > *Channel Mixer* dialog (be sure to activate the *Monochrome* option). The *Vibrance* dialog can also be used to desaturate color images and you can, of course, perform monochrome conversion during RAW conversion, too.

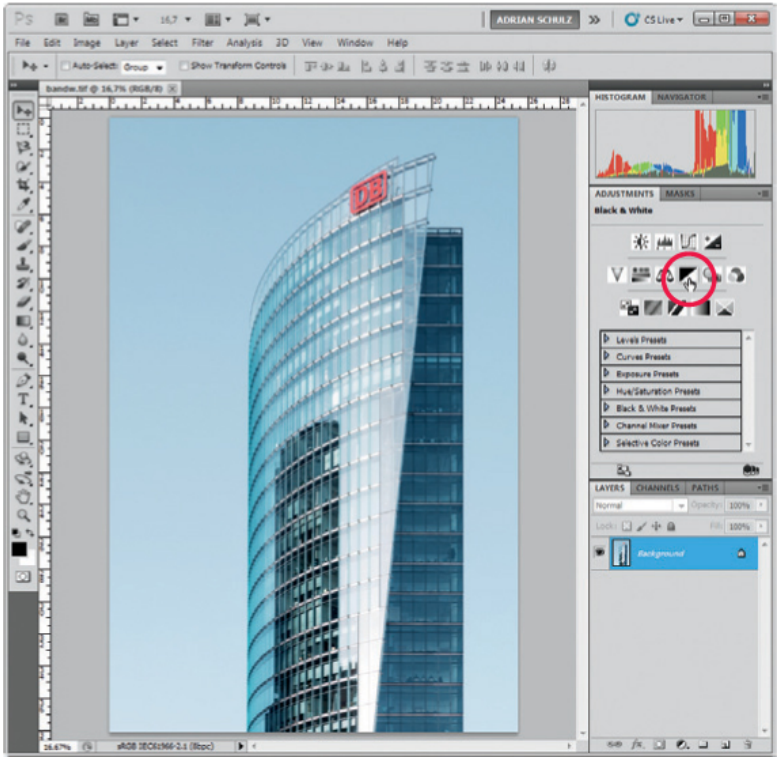


Fig. 342

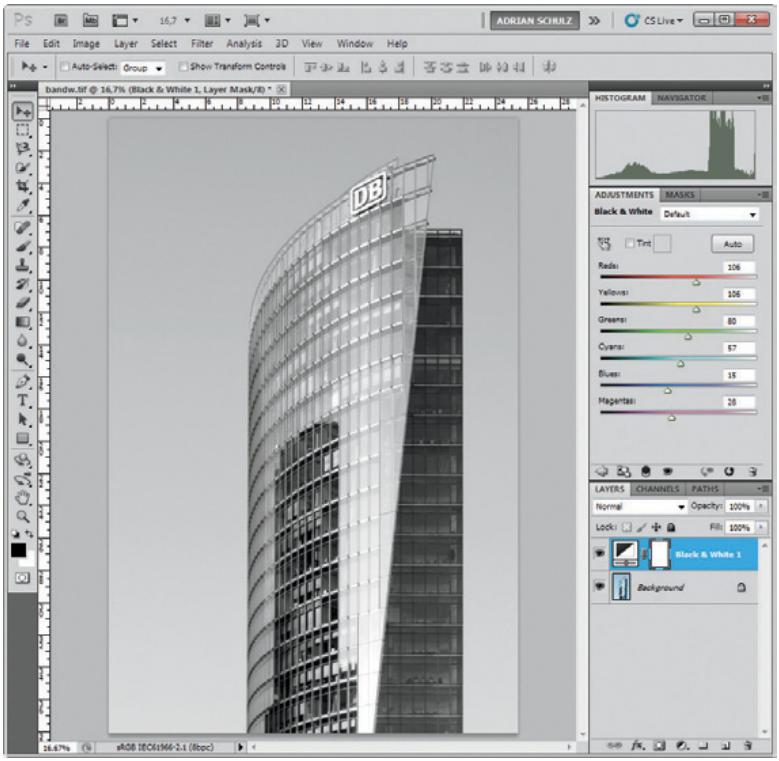


Fig. 343

4.6.4 Creating Fake Miniatures Using Photoshop

To create a “fake miniature” look using Photoshop, you have to reduce depth of field artificially by applying two focus gradients to an image. The most effective results can be produced using source images with relatively large depth of field that were taken from a raised viewpoint and which contain a number of objects for comparing scale (in our case, cars). Objects in the near foreground spoil the effect, so try to avoid including any if possible.

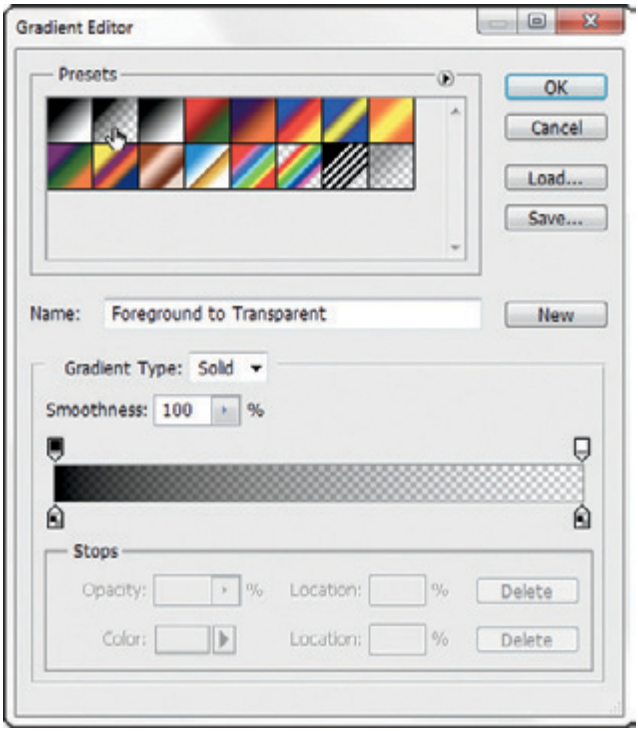


Fig. 344

Open an image and set the foreground color to black. Now switch to the *Gradient Tool* and select the *Foreground to Transparent* preset in the *Gradient Editor* window (fig. 344; reached by double clicking the gradient preview). Switch to Quick Mask Mode (fig. 345). You can now create two gradients (marked in red) which show the areas of the image that will appear blurred in the finished version (fig. 346). The narrower the non-colored part of the gradient, the stronger the final effect will be. Switch back to Normal Mode (using the same button)—the red gradients will disappear and the area that is to remain in focus appears as a selection. Keep the selection active and select the *Filter* > *Blur* > *Lens Blur...* filter (fig. 347). Select a high *Radius* value and optimize the results by changing the *Shape* setting and adjusting the *Blade Curvature* and *Rotation* sliders. You can regulate the appearance of specular highlights by selecting appropriate *Threshold* and *Brightness* values. Leave all other sliders at their default or *0* settings, and click *OK* to apply the new gradients to your image (fig. 348). This can take some time, even if you are using a powerful computer, so be

patient. You can then fine-tune the finished image and accentuate the miniature effect by increasing saturation and contrast as necessary.

Fig. 345

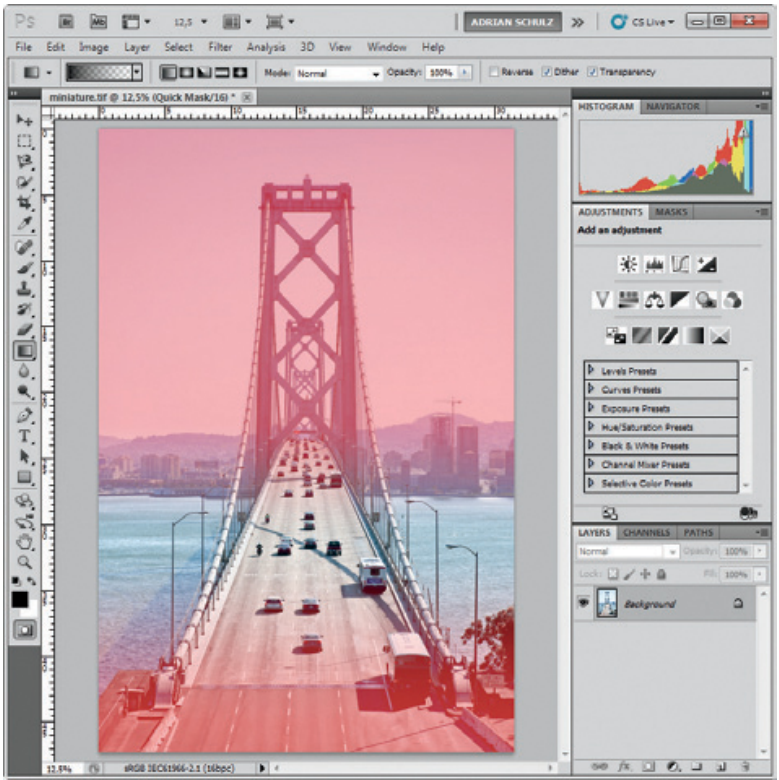

File Edit Image Layer Select Filter Analysis 3D View Window Help
ADRIAN SCHULZ
CS Live
Mode: Normal
Opacity: 100%
Reverse
Dither
Transparency
miniature.tif @ 12,5% (Quick Mask/16) *
HISTOGRAM
NAVIGATOR
ADJUSTMENTS
MASKS
Add an adjustment
Levels Presets
Curves Presets
Exposure Presets
Hue/Saturation Presets
Black & White Presets
Channel Mixer Presets
Selective Color Presets
LAYERS
CHANNELS
PATHS
Normal
Opacity: 100%
Lock:
Fill: 100%
Background
12,5%
sRGB IEC61966-2.1 (16bpc)

Fig. 346

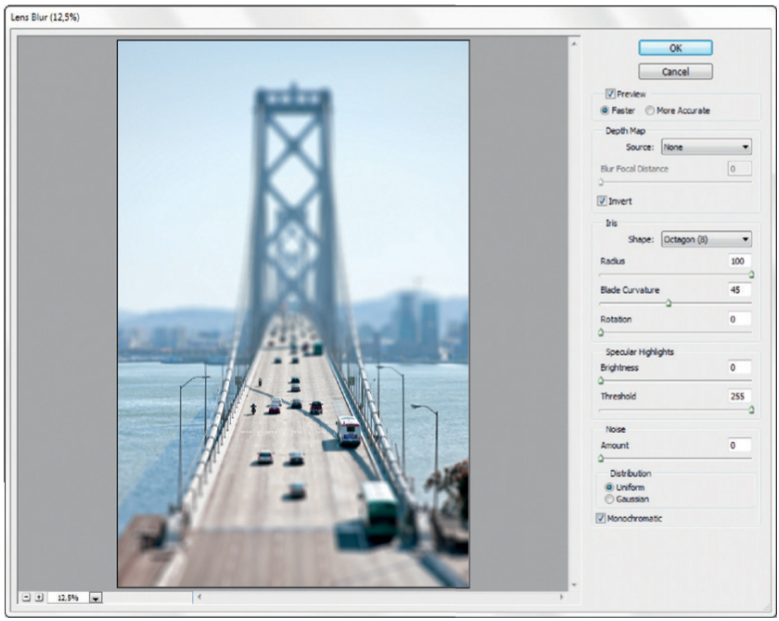


Fig. 347

Fig. 348

Index

A

Accessories 32 39
Adjustment Brush Tool
-(ACR) 178
Adobe Camera Raw 171
-Basic tab 173
-Camera Calibration tab 178
-Detail tab 175
-Effects tab 177
-HSL/Grayscale tab 175
-Lens Corrections tab 176
-Presets tab 177
-Snapshots tab 178
-Split Toning tab 175
-Tone Curve tab 174
Advertising photography 10
Aliasing 14
Analog medium-format cameras 24
Analog SLR cameras 22
Aperture 110
APS-C format 19
APS-H format 20
Arca-Swiss system 33
Architect 45
Architectural photography
-artistic 8 10 48
-documentary 7 8 43
-forms of 8
Archiving 17

Artistic architectural photography 8 10 48
Authenticity 7 17 45
Auto-Align Layers 209
Auto-Blend Layers 210
Availability of image files 12

B

Ball head 32
Banding 14
Barrel distortion 27 28 87
Basic tab 172
Batteries 37
Battery grip 39
Bayer Pattern 16
Before and After shots 153
Bird's-eye view 58
Black-and-white film 40
Blue hour 144
Bracketing sequence 117 136 155 212
Bridge camera 18
Brief guide to photographing buildings 54
Burned-out highlights 13
Burn Tool 210

C

Camera 18
  -battery 37
  -settings 110 134
  -standpoint 70 126
  -technology 11
Camera Obscura 3 5
Camera shake
  -preventing 155

Cast shadow 138
Center-weighted metering 113
Central perspective 57 126
Central projection 56 200
Chromatic aberration 27
  -correction 176
Color
  -correction 175 190
  -depth 167
  -management 170
  -noise 14
  -profile 170 195
  -shift 14
  -space 179
  -temperature 136 168 172
Compact camera 18
Comparison of pixel sizes 23
Composition 47 72 96 101 133
Compressed perspective 79 83
Computer 170
Concentrator lens 17
Contrast mask 198
Control Points settings 202
Converging verticals 59 60
Correcting perspective errors 182
CPU 170
Creative tips 39 148 220
Crop factor 19 22 24 155
Crop Tool 178 186 210
Curves 189
Cylindrical panorama 90 200

D

Depth effects 79

Depth of field 26 83 110 154 224
Depth perception 79
Details Enhancer 214
Diffraction blur 110
Digital
-camera back 24
-compact 18
-full-frame cameras 22
Distortion 28 87
-correction 176 182
Documentary architectural photography 7 8 43
Dodge Tool 210
DRI
-image 117 136 155 212
-in Photomatix Pro 215
-in Photoshop 218
DSLR 19 22
Dust 15 22 39 124 178
DX format 19
Dynamic range 12 113 212

E

Edge softness 27
Enblend 205
EVIL camera 21
Exif Data 180
Exposure 113 173
Exposure Fusion 215
Exterior light 136
Exterior situations 28
External factors 139
Extreme framing 148
Eye level 129

F

Fake miniatures 154 224
Field of view 90 151 205
Film grain 14
Filters 35 118
Fisheye lens 87
Fixed focal length lens 28 40
Flange focal distance 36
Flash 39 135
FocalBlade 195
Focal length 28 83 129
Focusing screen 36
Foreword 1
Forms of Architectural Photography 8
Four Thirds format 19
Framing 96 108 133
Full-frame format 22
FX format 22

G

Golden Ratio 96 100 133
Graduated filter 35 118 220
Graduated Filter Tool 178
Grain 14
  -effects 40
Graphics card 170
Grid focusing screen 36

H

Hardware 170
HDR
  -image 117 136 155 212 222

-in Photomatix Pro 212
-in Photoshop 216
Histogram 120 173 192
History of architectural photography 2
Horizon 57 67 87
Hue 175 192 223
Hugin 200

I

Image
-adjustments 181
-artifacts 14
-composition 47 72 96 101 133
-format 90 131 166
-noise 14 113 168 190
-orientation 94
-processing 17 165
-sensor 12 16 24 113
-sequence 151
-sharpening 175 194
Interior
-shots 121
-situations 28
-subjects 121
Interpolation 16
ISO Sensitivity 113

J

JPEG 166 195

L

Landscape format 90

Large-format camera 25
Layer mask 189
L-bracket 33
Learning to see 52
Lens
  -adapters 36
  -hoods 34
  -mount 36
  -quality 17
Lensbaby 40
Lens Blur 224
Lens Correction 182
Lenses 26
LensFix 182
Lighting 134
LightMachine 198
Light yield 23
Live view 21 36 67
Local contrast 192 214 218
Long focal length lenses 83
Low-pass filter 14
Luminance 175
  -noise 14 175

M

Magic Wand Tool 187
Magnetic Lasso Tool 210
Matrix metering 113 135
Medium format 24
Memory card 12 37 169
Microlens 17
Miniature faking 154 224
Moiré 14
Monitor 170

Motion blur 110
Move Tool 209
Moving objects 104

N

Neutral density filter 35 118
Night shoot 144
Noise 14 113 168 190
Noise reduction 168 175 190
Non-destructive processing 166

O

Optical
  -axis 66
  -bench 25
  -quality 28
  -viewfinder 21
Orientation 94
Overexposure 117 153 173

P

Panorama 88 90 131 200
  -cylindrical 90 200
  -planar 88 200
  -shift 88 208
  -spherical 90 200
Panorama head 33
Pan/tilt head 32
Perspective 56 72 126
Perspective correction 64 176 182
Photographer 45 158
Photomatix Pro 212 215 222

Photomerge 206
Pincushion distortion 28
Planar panorama 88 200
-creating with Hugin 200
-creating with Photoshop 206
Plug-ins 182 190 198
Polarizing filter 35 118
Polygon Lasso Tool 186 210
Portrait format 90
Postcard photography 8
Post-processing 181
Pseudo-HDR 222
PTLens 182

Q

Quick Mask Mode 224
Quick-release clamp 33
Quick-release head 33

R

Rain cover 39
RAM 170
RAW 166
-conversion 171
Rectangular Marquee Tool 186 210
Rectilinear 202 204
Reflections 139 152
Remote release 33
Resolution 12 179
Rule of Thirds 96 100 133

S

Saturation 173 175 192
Saving images 17 195
Scanning back 25
Scheimpflug principle 68
Seasons 146
Selective
-brightening 190
-brightness adjustment 197
-color 190
-contrast correction 197
-darkening 187
-focus 27 40 111
Sensor cleaning 15
Sepia tint 223
Shadows 138 139
Shadows/Highlights 197
Shallow depth of field 154
Sharpening 166 175 194
Shift
-adapter 66 89
-lens 31 59 66 88 208
-panorama 88 208
Shooting techniques 41
Shooting upwards 151
Short focal length 81 85 87
Shutter speed 110
Slide film 17 113
Spherical panorama 90 200
Spirit level 39 66 91
Split Toning 175
Spot Removal Tool 178
SRGB (IEC61966-2.1) 170 179
Standpoint 70 126
Straighten Tool 178 182

Subject 47 51 121
Subject distance 61 70 79 126
Suitable subjects 51
Super-wide-angle lenses 28 85
Surroundings 48 76 101
Symmetry 79

T

Telephoto lens 28 83
TIFF 195
Tilt function 68 154
Tilt/Shift lens 31 59 66 88 208
Time of day 144
Tonal range 12
Tone Compressor 214
Tone Curve 217
Tone mapping 117 214 222
Transform 184 207
Tripod 32
  -head 32
Two-point perspective 57 126
Types of buildings 51

U

Ultra-wide-angle lenses 28 85
Underexposure 117 153
Unsharp Mask 192 195
Upward views 151

V

Vacation photography 10
Vanishing point 57

Vibrance 173 192 223
Viewfinder 18 21 24 26 66 91
Vignetting 27 176

W

Ways of seeing 45
Weather 143
White balance 136 168 172
White Balance Tool 172
Wide-angle lens 28 87
Workflow Options 179
Worm’s-eye view 58

Z

Zoom lens 28 83 87 177